

THE

ILLUSTRATED

GLOBE ENCYCLOPÆDIA

OF

UNIVERSAL INFORMATION.

EDITED BY

JOHN M. ROSS, LL.D.

SENIOR MASTER OF ENGLISH LANGUAGE AND LITERATURE, HIGH SCHOOL
OF EDINBURGH

VOL. II.

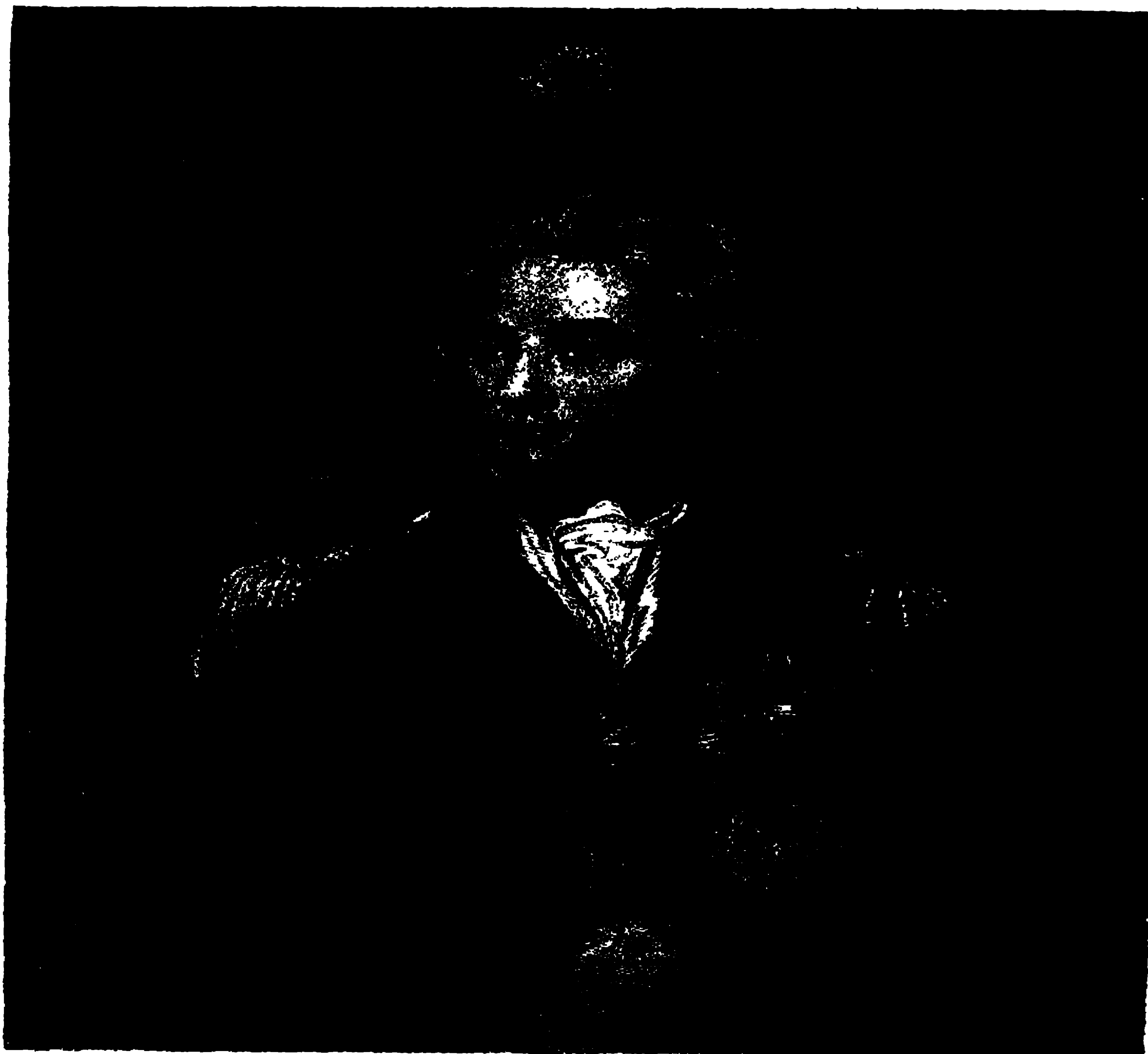
CAN—EZZ.

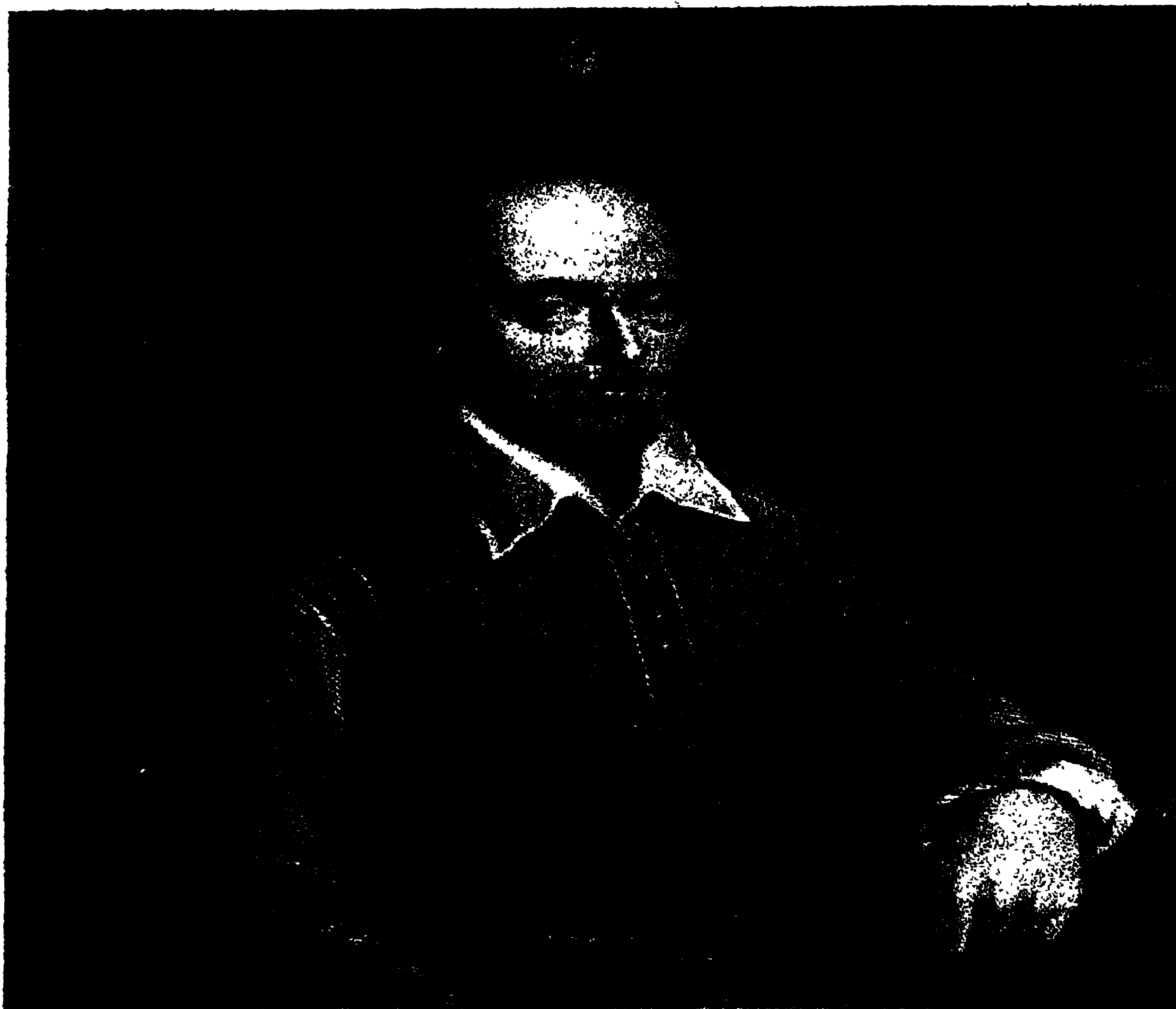
A. FULLARTON & CO.
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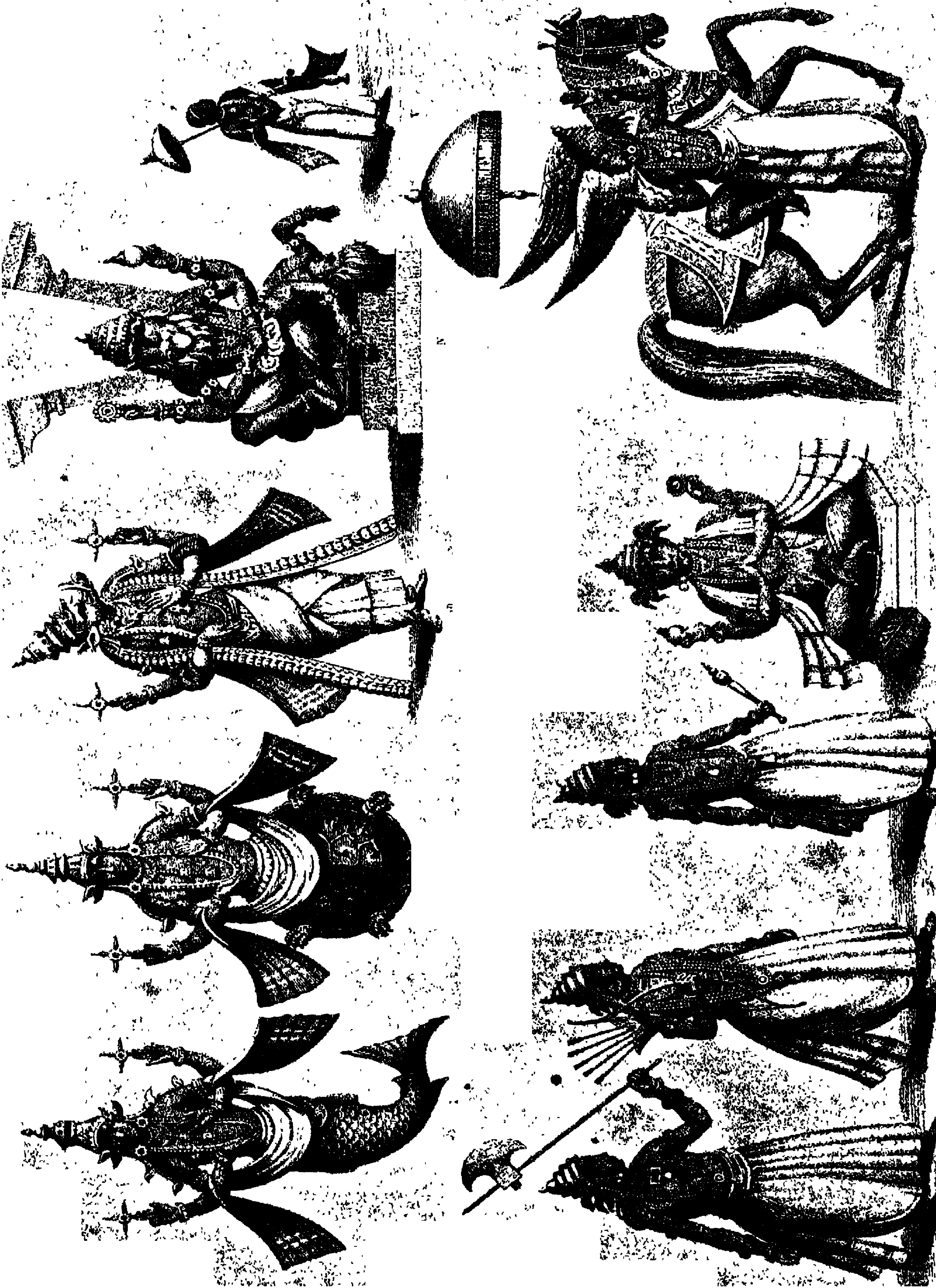


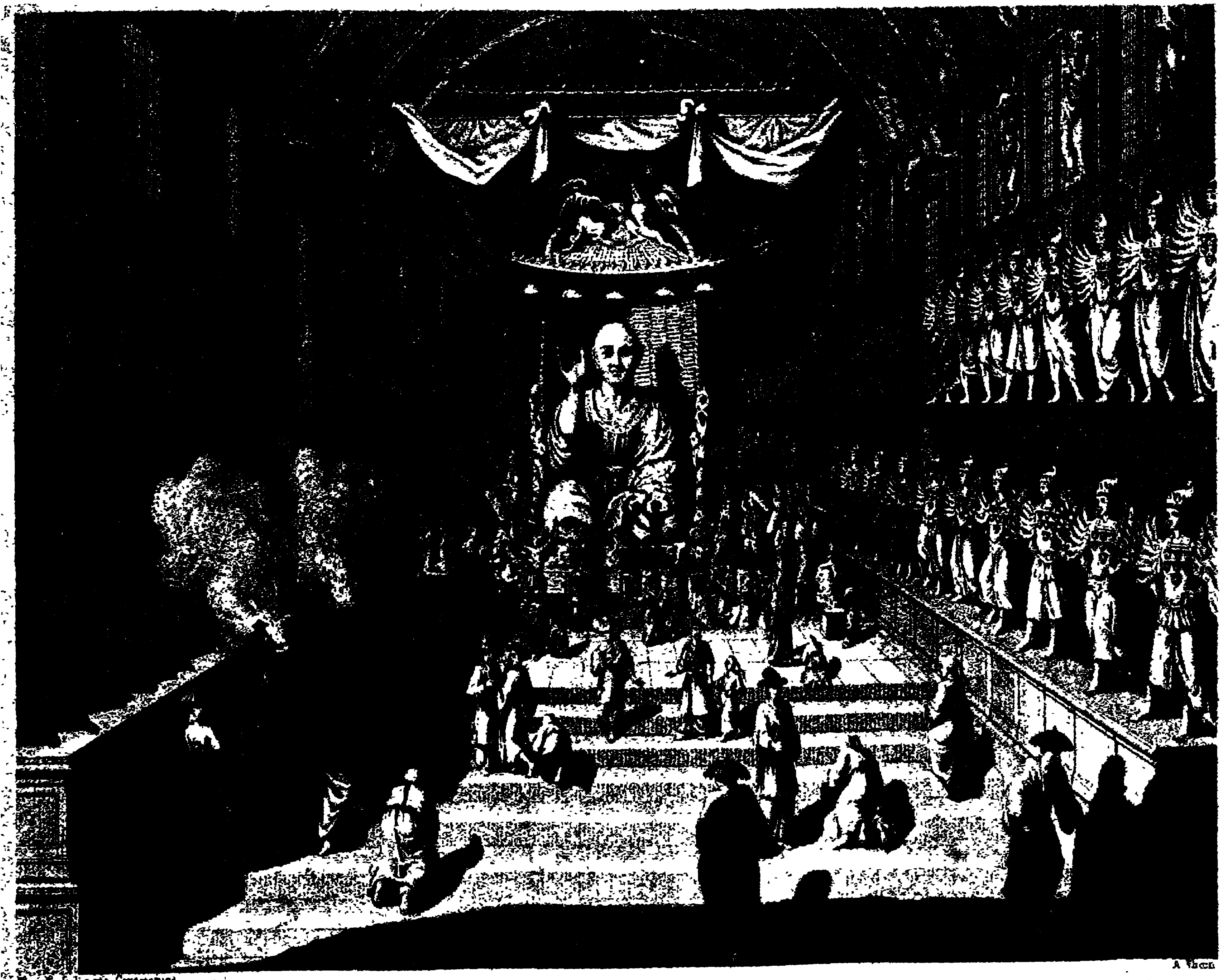
John Milton

JOHN MILTON









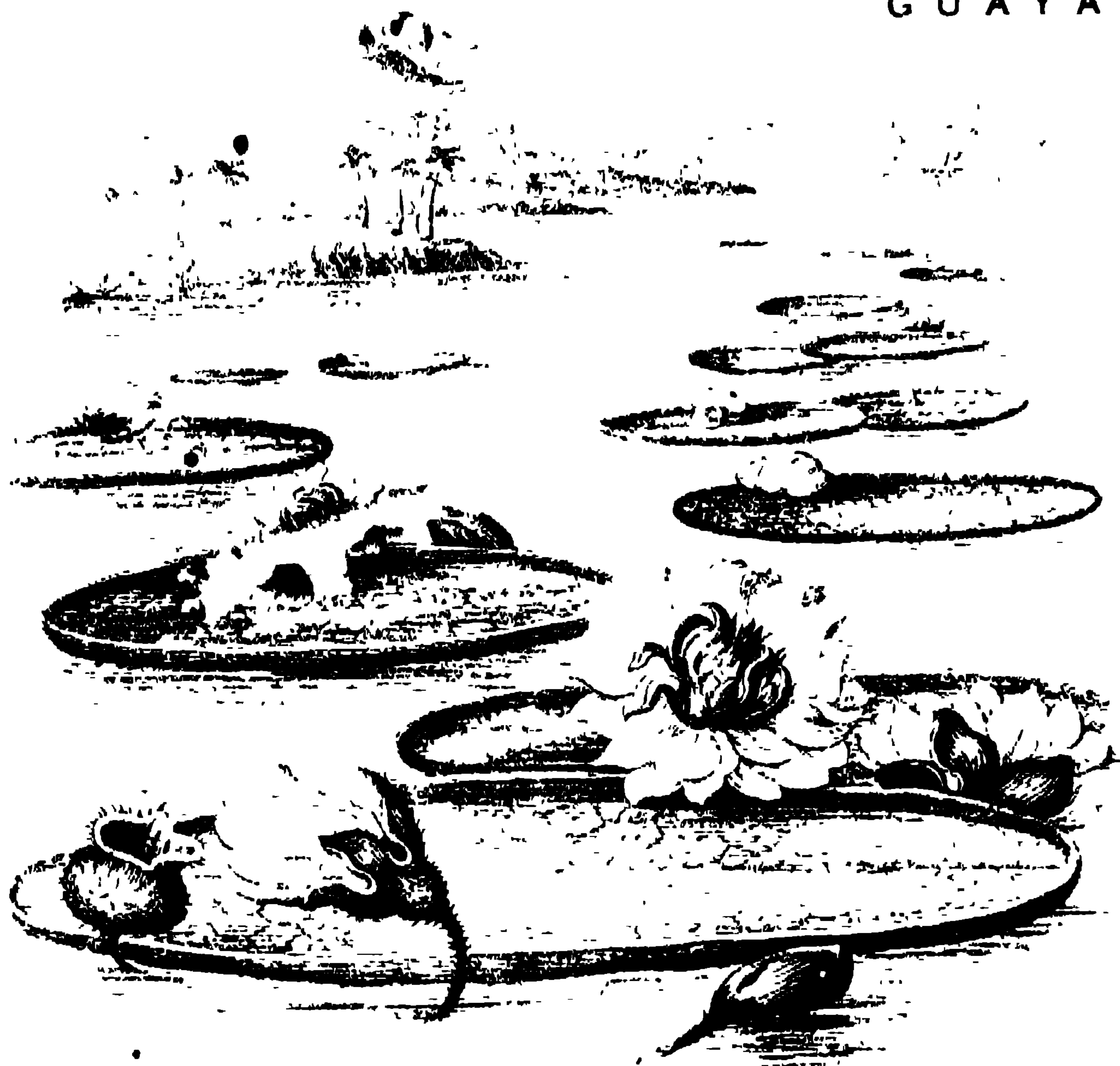
THE TEMPLE OF TEN THOUSAND IDOLS IN JAPAN.

TEML O DDENG MIL O EILUNOD YN JAPAN.



SCENERY AND ANIMATED LIFE

GUAYANA I



[illegible]





MACUSI PARAVILHANO WARRAU
(NATIVE TRIBES OF GUAYANA)



[illegible]

A. Fullarton & Co. London & Edinburgh.

SCENERY AND ANIMATED LIFE

GUAYANA II

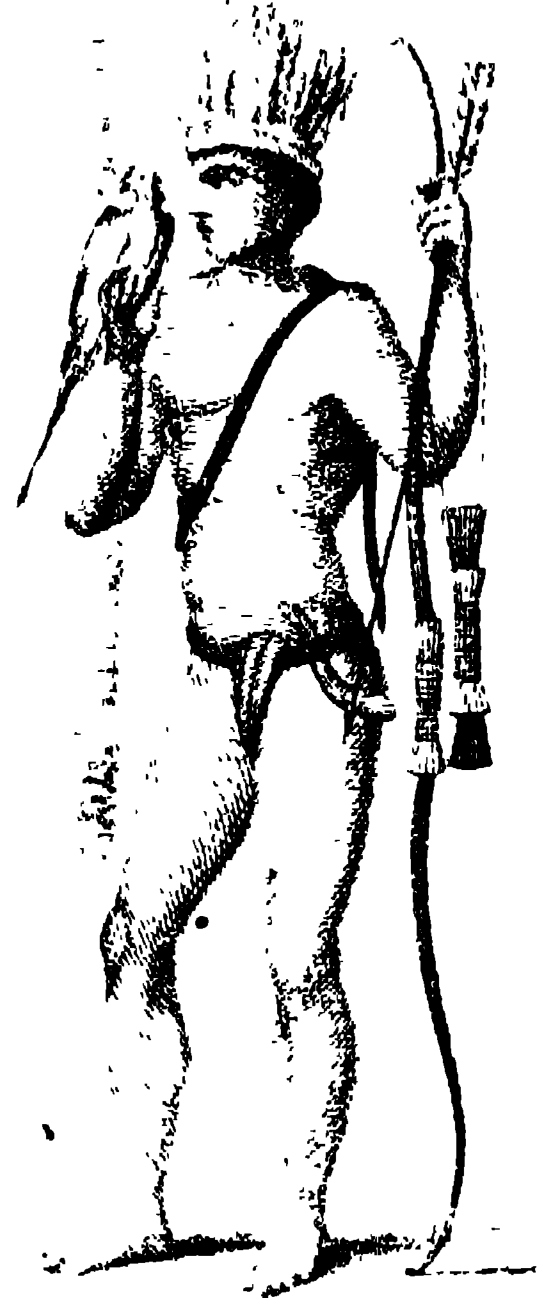


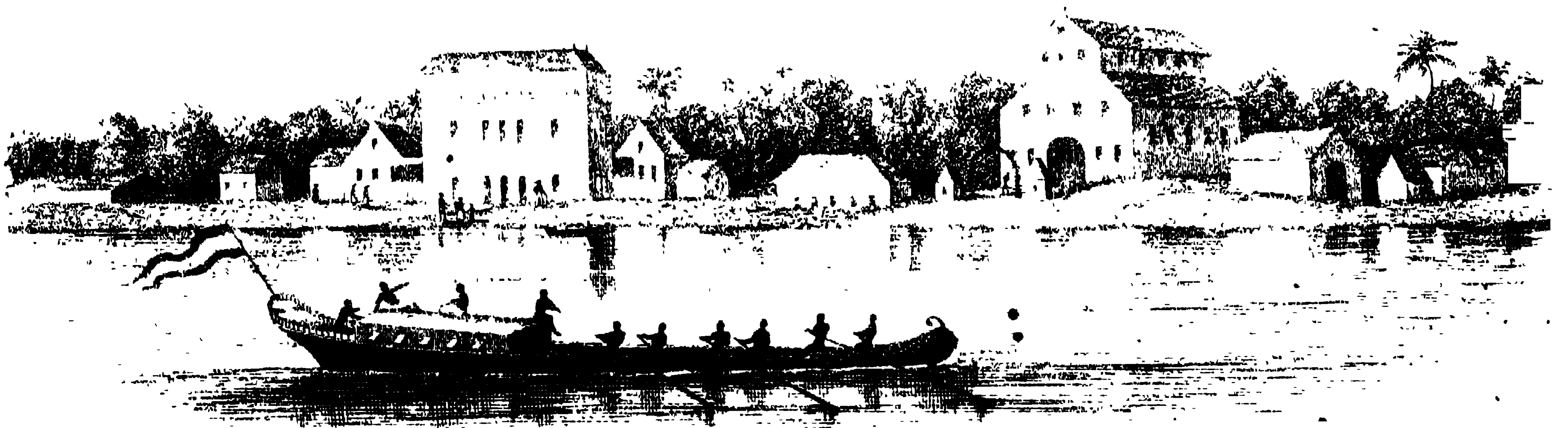




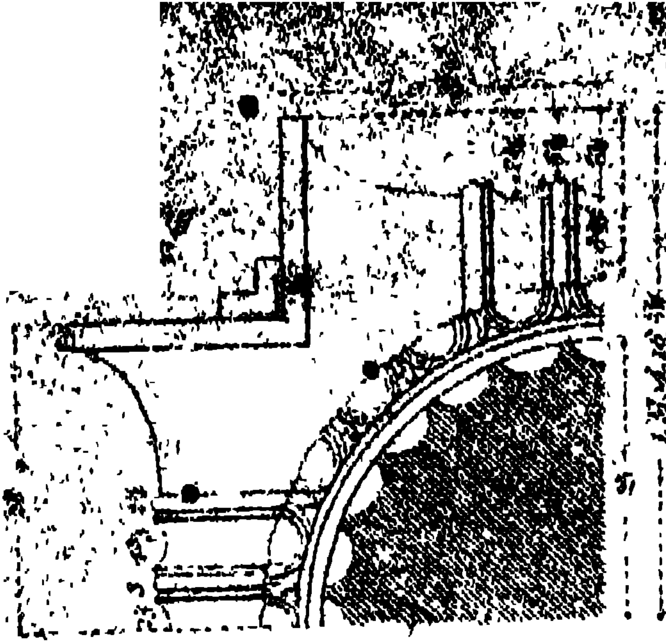
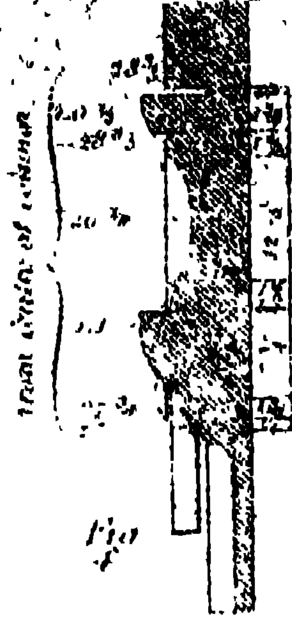




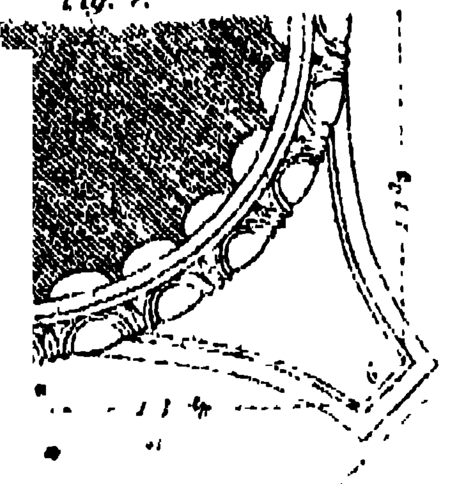


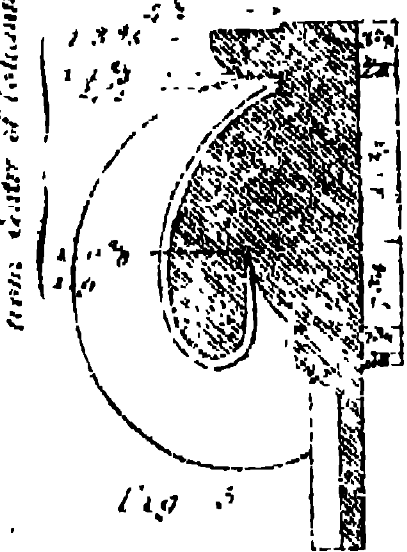


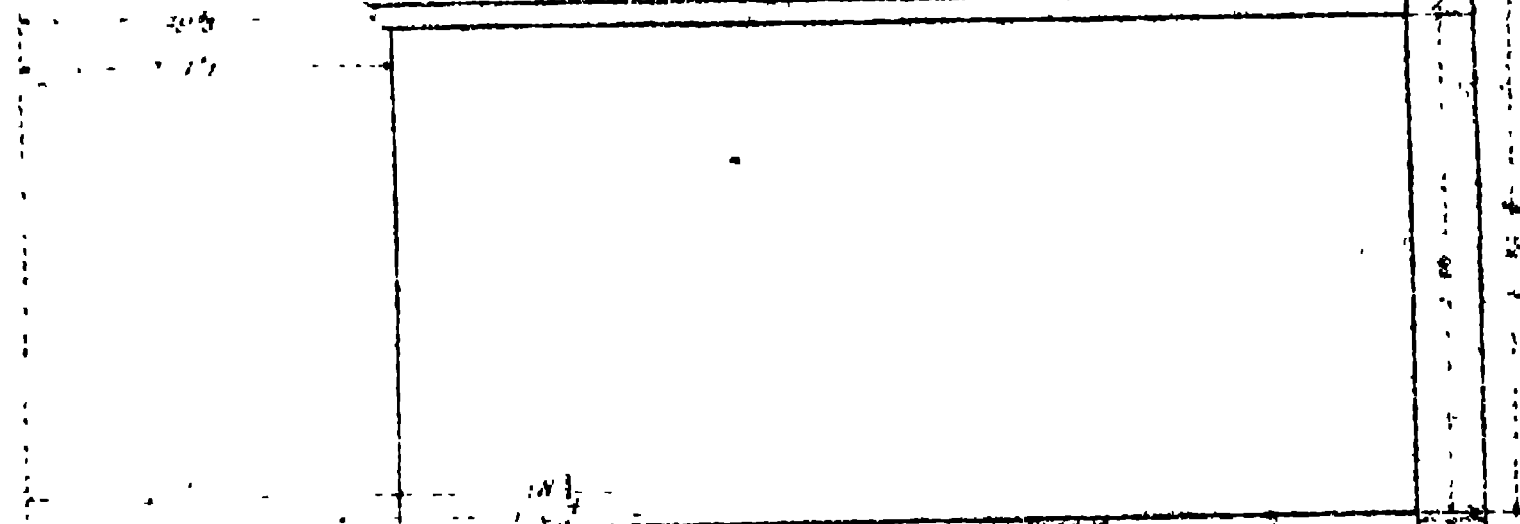
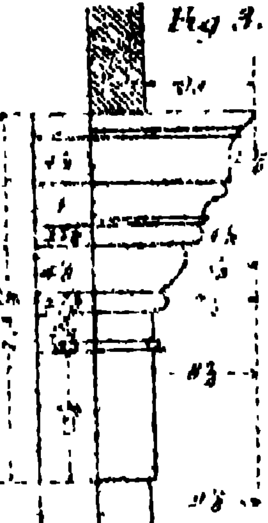
ARCHITECTURE III
IONIC
FROM THE TEMPLE ON THE RIVER ILYSSUS NEAR ATHENS

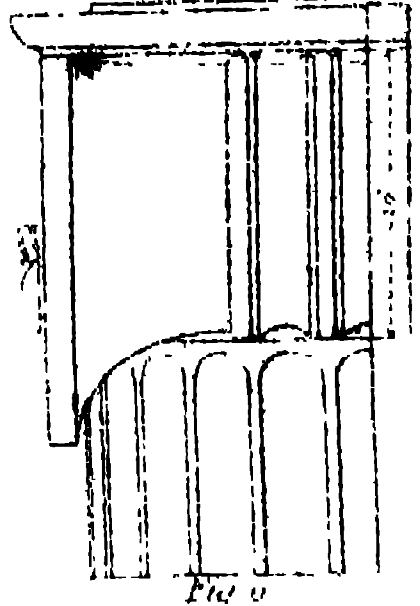
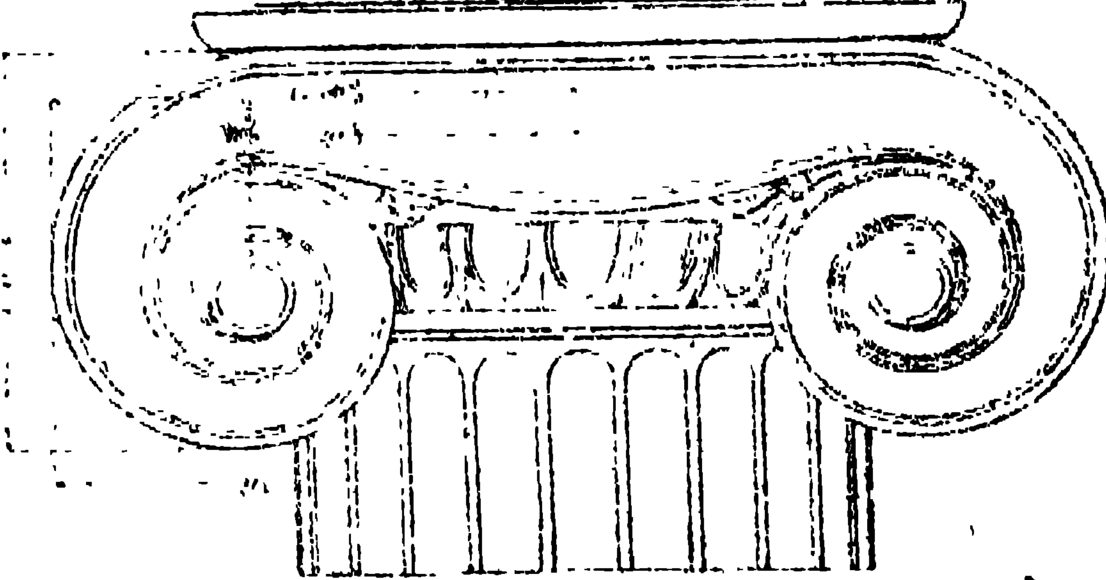



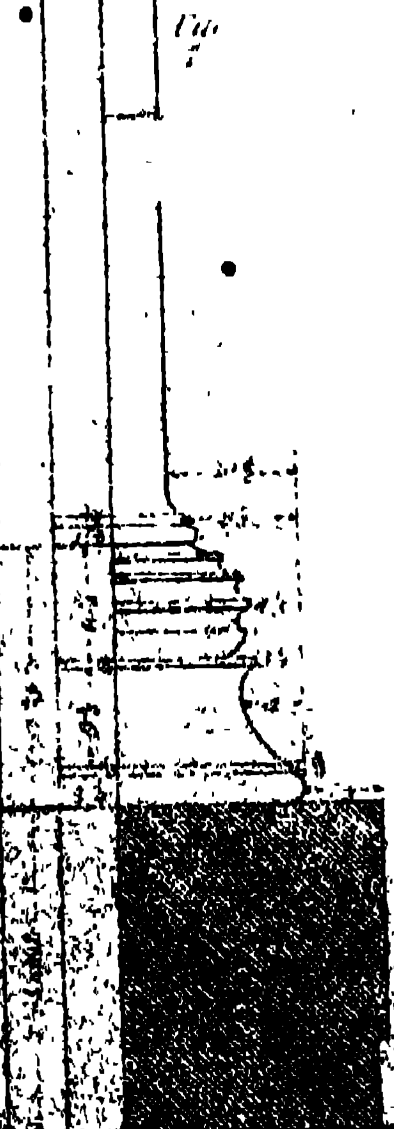
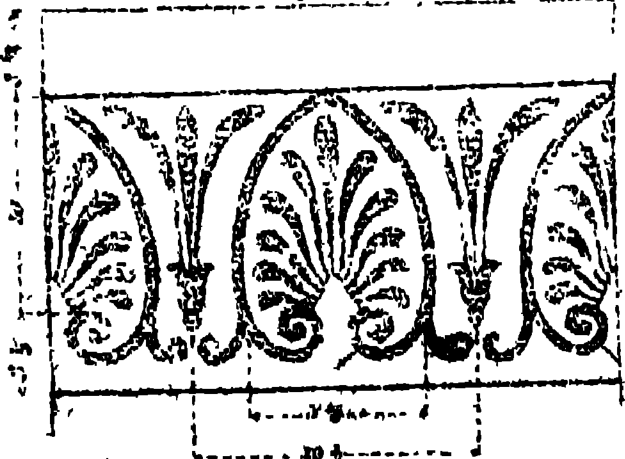


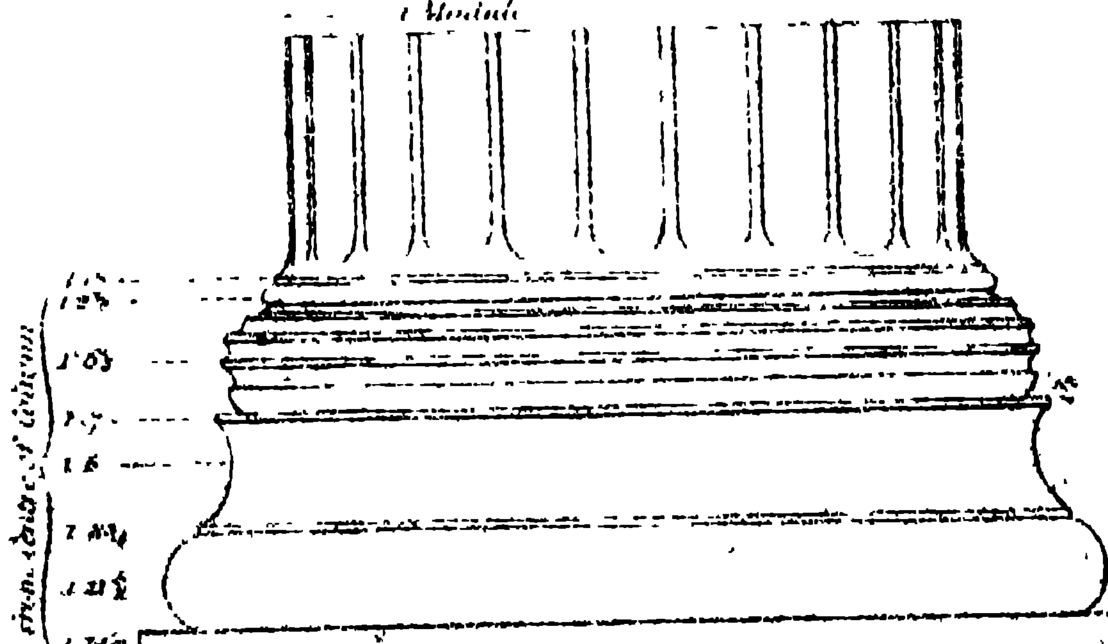




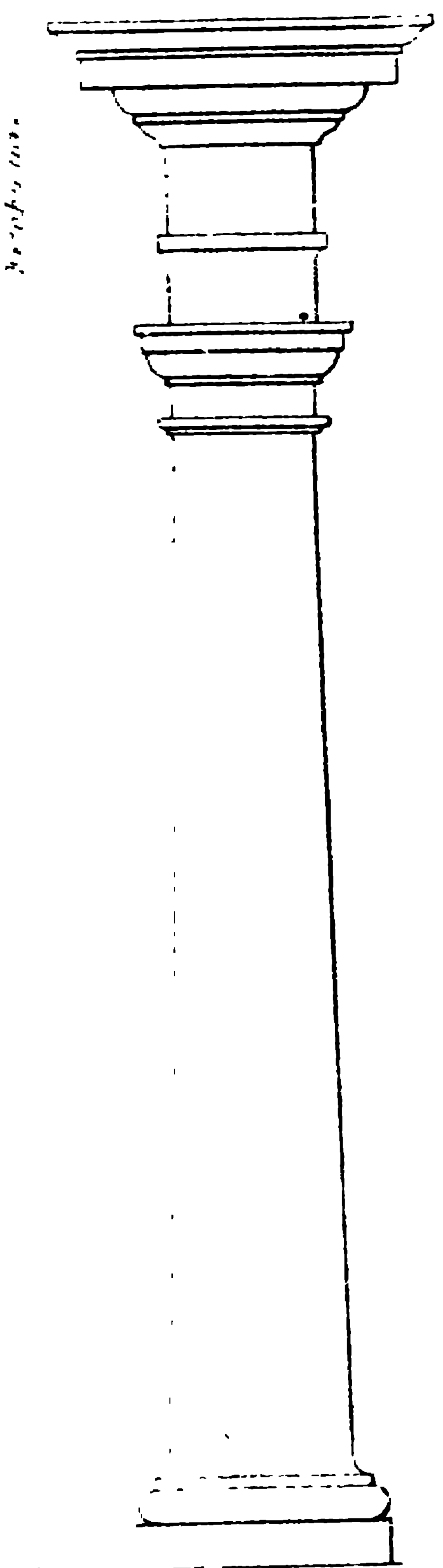


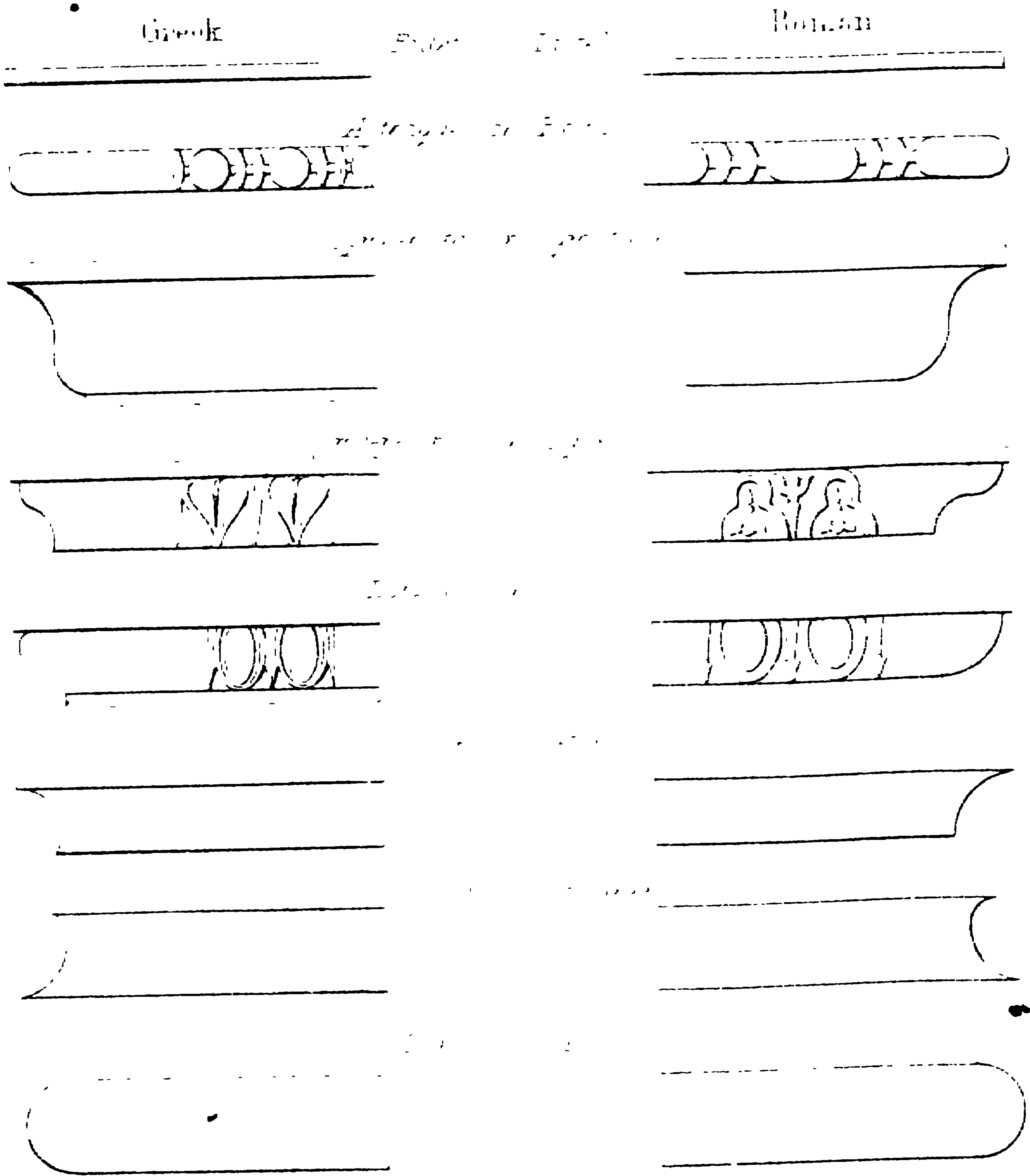


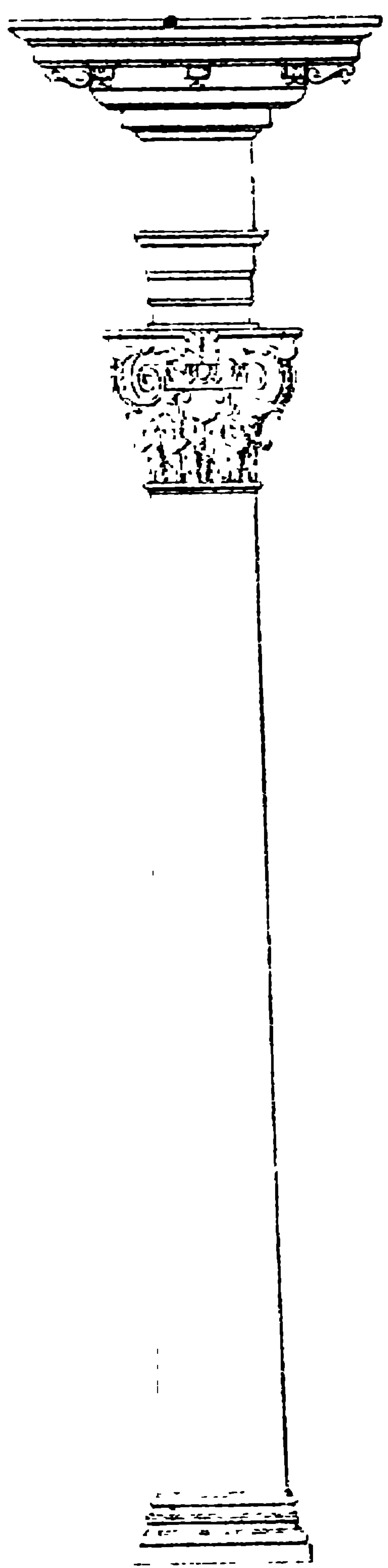
Scale of Feet

ARCHITECTURE IV

ROMAN EXAMPLES – THE REGULAR MOULDINGS







[illegible] R Aschamus J. Q. Adams

12

[illegible] Sam^l W. Baker John Bright

7 5

J. Carr[illegible] G. T. Beauregard

6 11 9

Charles Barry Ro. Boyle Jac Berzelius

10 17 13

D. Brewster I. K. Brunel B. C. Brodie

15 14 16

Brougham C. Brontë Thomas Brown M.D.

18 19

G. Buchanan Frank Buckland

20 22 23

J. Bunyan Willm Camden T. Campbell

Butler

9 Berzelius, J. E. Chemist
10 Brewster, Sir David, [illegible]
11 Boyle, Robert, Philosopher
12 Bright, John, [illegible]
13 [illegible] Sir Benjamin, [illegible]
14 Brontë(?), Charlotte(?), Novelist(?)
15 Brougham(?), Henry(?), [illegible]
16 [illegible]

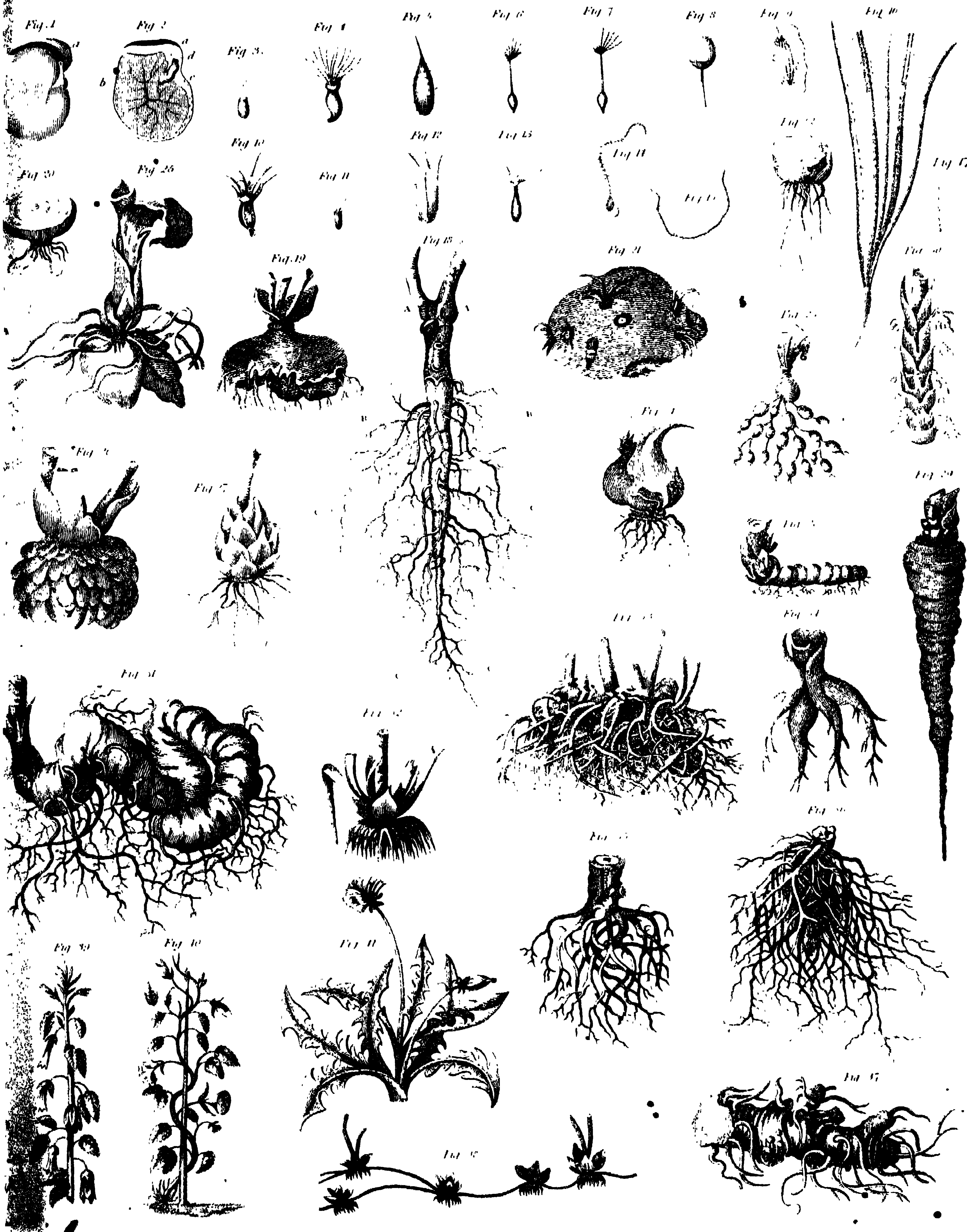
17 Brunel, Sir I. K. Engineer
18 Buchanan, George, Scholar
19 Buckland, Frank, Naturalist
20 Bunyan, John, [illegible]
21 Butler, Samuel, [illegible]
22 Camden, William, Antiquary(?)
23 Campbell, Thomas, Poet

ASTRONOMY I

THE ORBITS OF THE PLANETS _ FORMS OF NEBULÆ



BOTANICAL TERMINOLOGY I



HERALDRY _ THE FLAGS OF ALL NATIONS

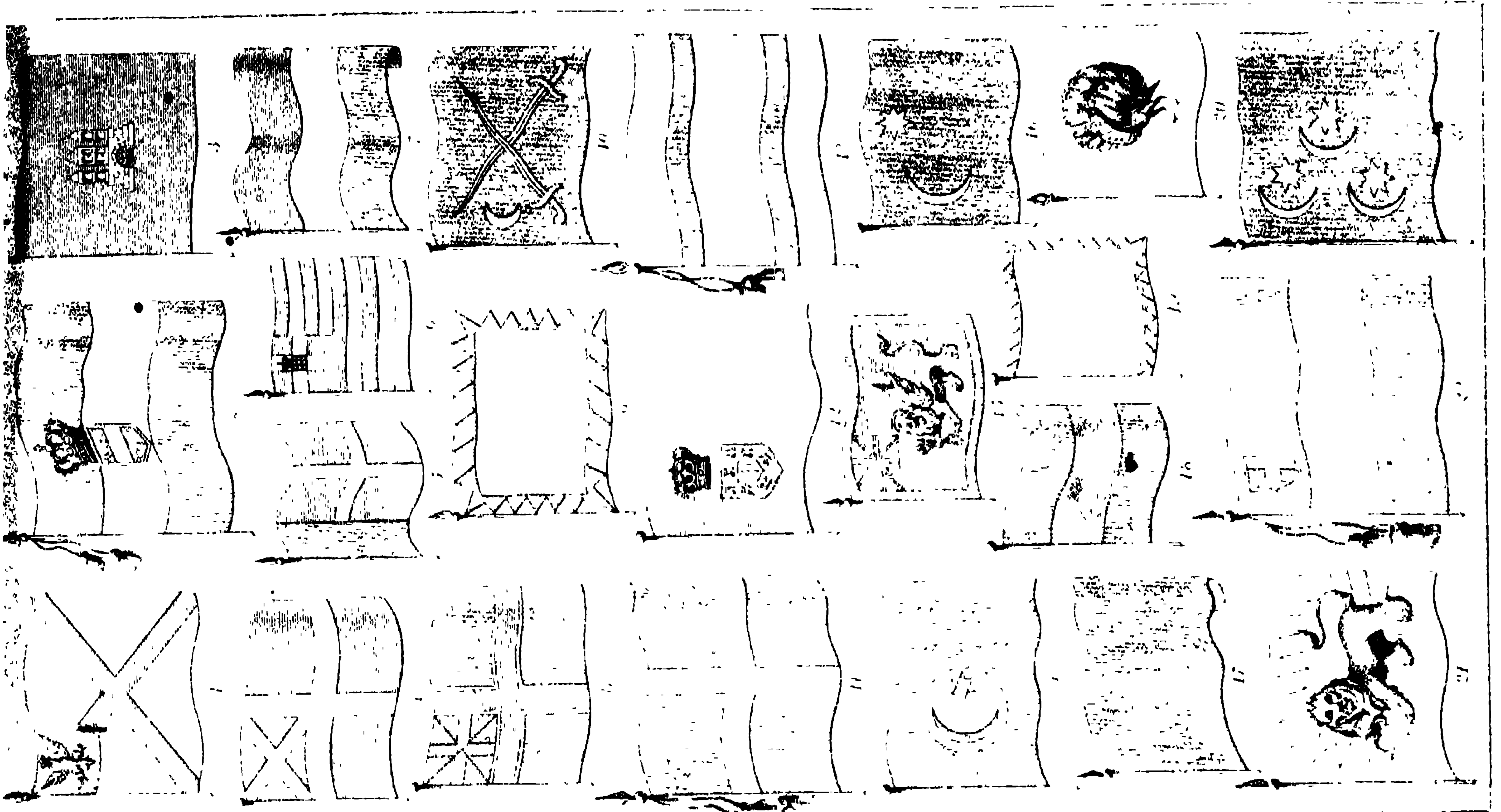
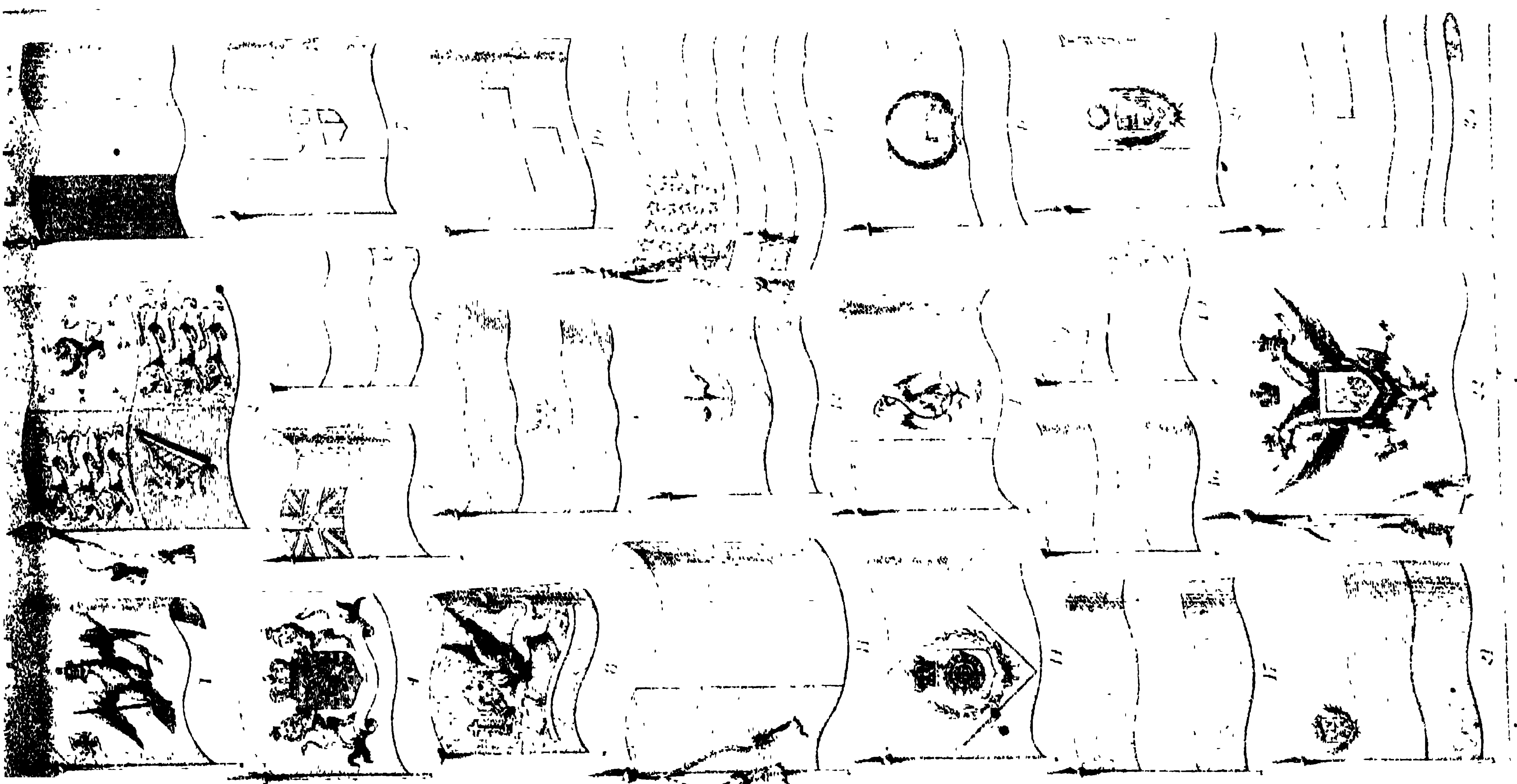


PLATE A.

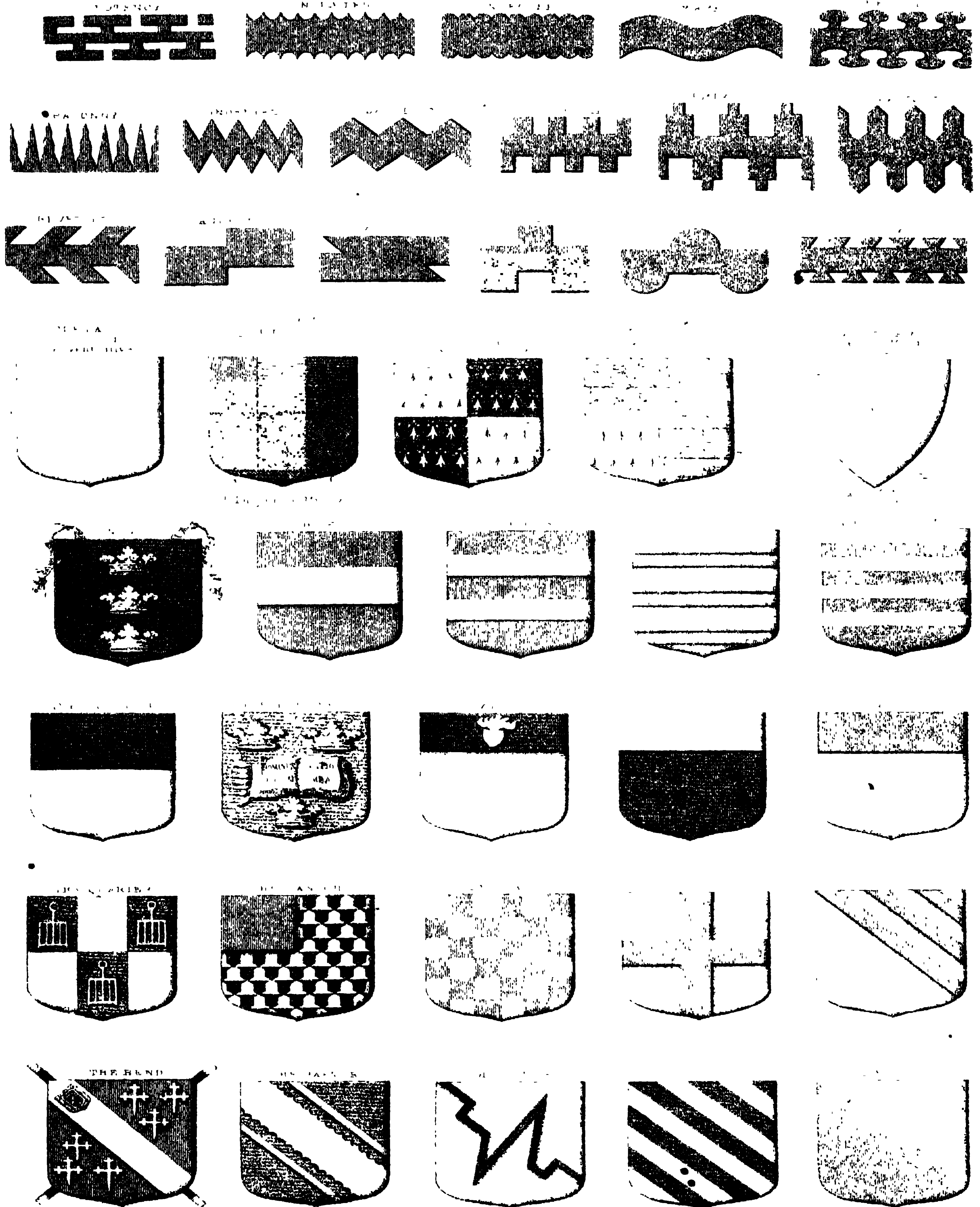
PLATE B.



Or	Argent	Gules	Azure	Sable	Vert	Purpure
Gold	Silver	Red	Blu	Black	Green	Purple

HERALDRY I

CHARGES IN BLAZONRY



O. THYSANOURA.

Lepisma Saccharina Mag.d

N. Nat. Size

Podura

O. ANOPLURA.

Pediculus of the Goose Mag.d

O. COLEOPTERA.

Common Glow Worm

larva *pupa* *fem.*

ova *larva* *ovum* *fem*

mas

O. STREPSIPTERA.

Stylops Kirbii

O. DERMAPTERA.

Forficula Auricularia

Magnified

Large Buprestis

O. ORTHOPTERA.

Gryllus Migratorius

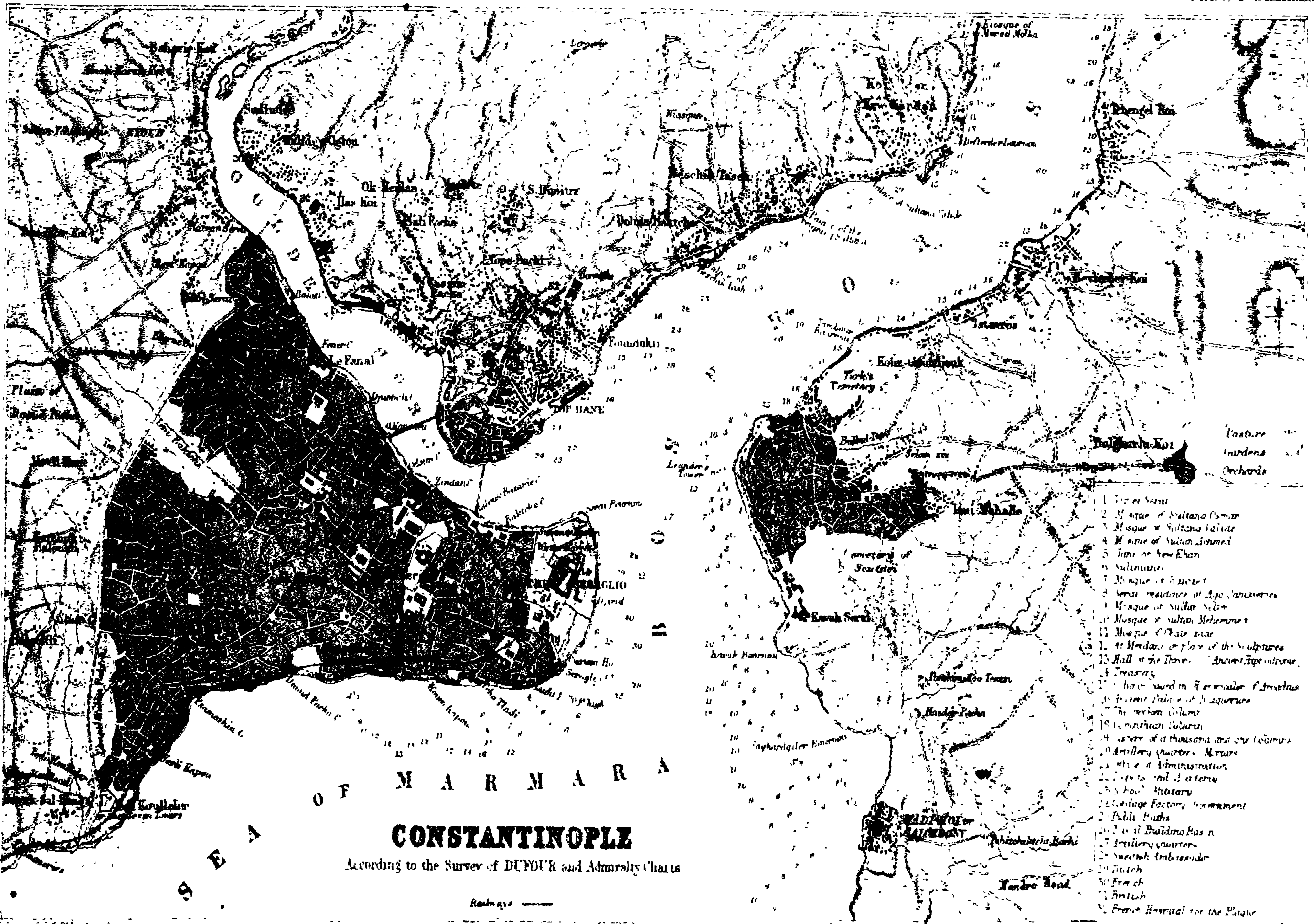
O. DIETROPTERA.

Blatta Orientalis

O. HEMIPTERA.

Naucoris Cimicoides

A. Fullarton & Co. London & Edinburgh.



CONSTANTINOPLE
According to the Survey of DUFOUR and Admiralty Charts
SEA OF MARMARA
Railways
Top Hane
Seraglio
Istavros
Scutari
Cemetery of Scutari
Leander's Tower
Mosque of Murad Molla
Pasture
Gardens
Orchards
Plain of Daoud Pasha
Le Fanal
Zindan
Tomtuklu
Yeni Mahalle
Kadikoi or Chalcedon
Haidar Pasha
Kandili

ROME

WITH ITS

ENVIRONS.

According to the surveys of

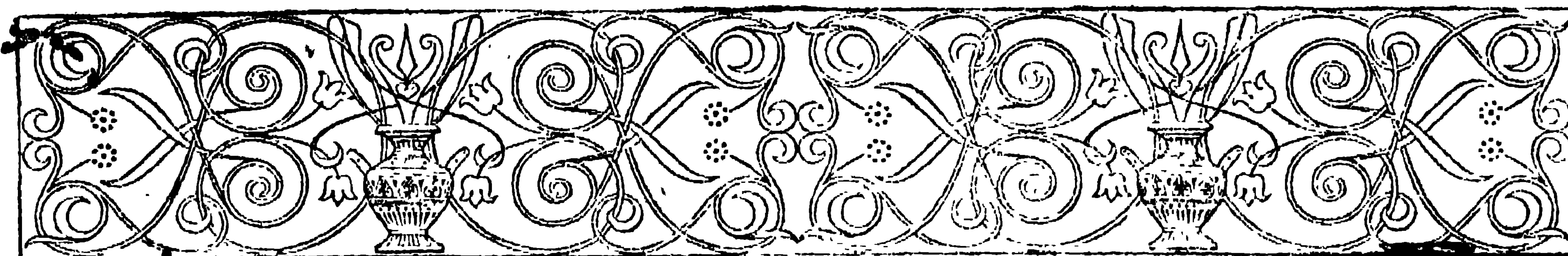
BARON MOLTKE

Drawn by Augustus Petermann F.R.G.S.

Engraved by G.H. Swanston

Geographical Miles





THE

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Cann'a, the name of a genus of plants belonging to the natural order *Marantaceæ*. The seeds are round, hard, and black; hence the name *Indian shot* applied to the plants. They have very beautiful flowers, are accordingly favourite garden plants for out-of-door bedding during the summer months. *C. edulis* of the W. Indies, and probably other species of C. also yield *Tous-les-mois*, a kind of arrowroot. The tubers of others are eaten, and in Brazil the seeds of C. are used as beads, and the leaves for packing goods.



Canna Annaei.

Cannabina'ceæ, the hemp order, a natural order of Dicotyledonous plants, natives of the temperate part of the northern hemisphere in Europe and Asia. It has but two genera, each containing two species, but both of great economic and medicinal importance. The order yields fibres, and possesses narcotic, tonic, and stomachic properties. Hemp (q. v.) and Hop (q. v.) are the important products of the order.

Cann'æ, a small town of Apulia, about 6 miles from the mouth of the Aufidus. Here the Roman army sustained a terrible defeat by Hannibal, probably in June of 216 B.C. The Romans numbered 80,000 infantry and 6000 cavalry, whereas Hannibal's army consisted of 10,000 cavalry, but only about 40,000 infantry. The Carthaginian cavalry under Hannibal, having defeated the right wing of the Romans, attacked in the rear successively their left wing and their centre. No quarter was given. Of the Romans 70,000 fell, including the Consul Lucius Paullus, and eighty men of senatorial rank. Hannibal lost not quite 6000 men.

Cannes ('the reedy'), a seaport in the Riviera department of Alpes-Maritimes, France, on the Gulf of Napoule, about 22 miles S.W. of Nice, and a station on the Lyon Railway. It has a fine climate, which has made it a favourite resort of invalids. The most remarkable buildings in the town are the casino, the picturesque Pont-du-Rion, built about 1070, on the site of an earlier Roman bridge, and a tower of the old abbey commanding a superb view of the Mediterranean. The orange, fig, vine, olive, and other southern fruits flourish, and, along with oil and perfumes, form the staple exports. Off the coast tunny, sardine, and anchovy fisheries are carried on. Pop. (1872) 7844. Near this Napoleon landed, 1st March 1815, on his escape from Elba. Opposite to C. lie the *Îles de Lérins*.

Cann'ibal (*Canib* for *Carib*, one of the extinct aborigines of the W. Indian Islands), Gr. **Anthropophagos**, or man-eater. In Homer's *Odyssey* there is the story of Polyphemus devouring human flesh, and in Herodotus the Massagetæ and the Padæi are spoken of as killing and eating their relations when they become aged or ill. The poet also says that when a man's father dies among the Issedones, his relations come and help him to eat the dead body. Among the ancient Tupis of Brazil, when the chief despaired of a sick man's recovery, his final advice was that he should be killed and eaten. The early Christians regarded pagans as man-eaters. St Jerome asserts, that, when a boy, living in Gaul, he beheld the Scots—a people of Britain—eating human flesh, in preference to the flesh of cattle and sheep, which were plentiful. When the Lombards invaded Italy, in the second half of the 6th c., it was reported of them that they were accustomed to this practice, as it was also of the Slavonian tribes a century later. During the Crusades, the Saracens charged the Christians with it, and the Christians retorted the accusation upon them. But, worse than this, Christian romancers converted their most approved hero, Richard Cœur de Lion, into a C. He is represented, after eating a few Saracens' heads with good appetite, as saying—

> 'King Richard shall warrant
> There is no flesh so nourisant
> Unto an English man,
> Partridge, plover, heron, ne swan,
> Cow—ne ox, sheep, ne swine,
> As the head of a Sarezyne.'

Marco Polo asserted that the Battas, a people of Sumatra, and the inhabitants of the Andaman Islands ate human flesh. It was reported of the Caribbees, that they preferred sucking infants to all other food, and of the Peruvians that they kept mistresses to breed children for their table, and that they fattened and killed these women when they gave over child-bearing. But these, and all the innumerable parallel assertions of older writers, must be received with a grain of salt. Late travellers, however, put it beyond doubt that cannibalism has been and is practised. The New Zealanders were down to a recent period systematic feeders on human flesh. They despised the aborigines of Australia, who fed on worms and herbs—larger prey not being available—and did not feed on their fellow-men. It is to be observed that while the latter were an extremely degraded type of humanity, the former were the most highly-developed aboriginal race with which European civilisation has come in contact. The extremities to which men have often been driven in sieges and ship-

wrecks, and the outbursts of ferocity in degraded natures, have frequently led to the occasional consumption of human flesh, but that is not systematic cannibalism.

Cann'ing, George, an English politician and orator, born at London, 11th April 1770, of Irish parents, was educated at Eton and Oxford at the expense of an uncle. His cleverness was shown in the school magazine, the *Mikrokosm*. At Oxford he met Jenkinson (afterwards Lord Liverpool). His vacations were frequently spent at Sheridan's house, where he met the leading Whigs. To their surprise he entered Parliament in 1793 under the auspices of Pitt, who in 1796 made him an Under-Secretary of State. At this time he opposed parliamentary reform and the proposed peace with France, but supported Wilberforce's motion on the slave trade. With Frere and Ellis he contributed largely to the *Anti-Jacobin*, of which Gifford was the editor. His speeches for the Irish union, his attacks on the Addington ministry, his defence of Lord Melville, all showed great talent for argument and satire. In 1807 he became Foreign Secretary under Lord Portland's ministry. This office he left after his duel with Lord Castlereagh in 1809, and in 1812 began, in conjunction with Grattan, his long series of efforts for Catholic emancipation. During several years he sat for Liverpool, and in 1816 became President of the Board of Control. He abstained from taking part in the proceedings against Queen Caroline. On the suicide of Castlereagh, C. again became Foreign Secretary, and giving up as hopeless the control of Spanish affairs, which, as ambassador to Portugal, he had considered important, he appointed diplomatic agents to Columbia, Mexico, and Buenos Ayres, as *de facto* independent, and sent British troops to defend Portugal from the despotic menaces of Spain. In April 1827, C. succeeded Liverpool as Premier. This caused the resignation of Eldon, Wellington, and Peel. C. now arranged the Triple Alliance for the preservation of Greece, promoted the Catholic cause, but repeated his declaration against parliamentary reform and the Test and Corporation Acts. He died rather suddenly at Chiswick (the Duke of Devonshire's seat), 8th August 1827, from the effects of a cold. It is thought that C. had opinions and resolutions far in advance of the political parties of his day. There was in his eloquence a piquancy and finish rare among English speakers. Cobbett always refers to him as 'that impudent spouter C.' His loftiness of aim and goodness of heart were not spoiled by his long parliamentary life. He was called by Quincy-Adams 'the most thoroughly English' of our politicians. Certainly his opposition to the Holy Alliance was well-timed and beneficial. His speeches were collected and published by R. Therry (6 vols. Lond. 1828). See also Bell's *Life of George C.* (Lond. 1846), and Stapleton's *C. and his Times* (Lond. 1859).

CHARLES JOHN, EARL C., son of the preceding, was born at Brompton, near London, 14th December 1812. Educated at Eton and Oxford, he entered Parliament as member for Warwick in 1836, and in the following year, on the death of his mother, succeeded to the title of Viscount, and was called to the House of Lords. In 1841 he was appointed Under Secretary of State for Foreign Affairs in the government of Peel, and in 1846 Commissioner of Woods and Forests. Hitherto he had not made any great mark as a politician, partly because he was entirely destitute of his father's gift of eloquence; but those who knew him well, valued his powers highly. In the Aberdeen ministry of 1853 he held the office of Postmaster-General, and continued to hold it when Palmerston was called to power in 1855. In March 1856 C. went out to India as Governor-General, and in little more than a year found himself face to face with the most terrible mutiny of modern times. He met it with a stern, silent fearlessness, which one cannot but admire as an essentially heroic mood, however much the wisdom of his conduct before the outbreak took place may be questioned. It is said that he was badly advised by an official coterie, that he was repeatedly warned of what was impending, and refused to believe it, and that he is, therefore, responsible in some measure for the subsequent massacres and disasters. Be that as it may, not a sound of alarm escaped his lips during the darkest days of the revolt; nothing moved him to rage or revenge when the hour of triumph came, and in the opinion of some, he helped to re-establish the English empire in India by his moderation and clemency no less than Havelock and Campbell by their valour. C. received for his conduct the thanks of both Houses of Parliament, was raised to the rank of Earl, made 'Viceroy of India,' and at once set himself to reorganise the shattered finance of the country. In 1862 he returned to England with a broken constitution, and died in London on the 17th June of the same year.

Canning, Stratford de Redcliffe, Stratford, Viscount, a notable English diplomatist, was the son of a London merchant, and cousin of George Canning. Born in 1788, he entered the diplomatic service in 1807, but did not hold any very important post till 1820, when he became Plenipotentiary at Washington. After visiting St Petersburg as Ambassador Extraordinary (1824), his cousin sent him to a similar post in Constantinople, where he attended the conferences of Akerman, but had to retire to Corfu before peace was agreed to after the battle of Navarino. In 1831 Lord Grey sent him back to assist in the final adjustment of boundaries and other Greek questions. From 1834 to 1841 he represented King's Lynn in Parliament, deprecating interference in Spain, and calling attention to Austrian aggression in Poland. In 1842 Peel sent him again to Constantinople, whither, after a special mission on Swiss affairs to M. Guizot in 1847, he returned to protect the Hungarian refugees, and to conduct that long discussion with Menchikoff, which decided Turkey to declare war against Russia, on the promise of help from England and France. In 1858 C. retired from service. The viscountship conferred on him by Lord Derby enabled him to give valuable aid in the House of Lords when foreign relations were under discussion. In 1873 he published a statement of his reasons for remaining a Christian.

Cann'on, the general name given to heavy ordnance or artillery, whether for fort, ship, or field service. It is a matter of controversy as to when C. were first invented. By some the credit is given to the Chinese, who are said to be in possession of C. made in 80 A.D. It is certain, however, that C. were used by Edward III. in his first campaign against the Scots in 1327, by the English at the siege of Calais in 1347, and by the Turks in the sieges of Constantinople in 1394 and 1453. The early C. were made of wrought iron bars bound together like casks by iron rings or loops, the latter, being driven on red-hot and contracting on cooling, gave great strength to the weapon. A good example of this system of C. building is the celebrated Mons Meg in the Castle of Edinburgh, said to have been forged at Mons in Flanders in 1486, and unfortunately damaged in firing a salute to James, Duke of York, in 1682, by part of the hoop near the touch-hole being blown away. The projectiles first used were knobs of stone, afterwards superseded by iron shot. In the second half of the 14th c. C., cast from an alloy of copper and tin in various proportions, were substituted for the built guns, and some time subsequently guns made from cast iron came into use, and, along with the bronze, or, as they are called, though erroneously, 'brass' guns, are used to some extent to the present day. One of the largest cast C. at present known to exist is a bronze one cast in commemoration of the capture of Bejapoor by the Emperor Alum Gir in 1685. It is 14 feet 1 inch in length, and the diameter of the bore is 2 feet 4 inches. At first cast C. were cast hollow, but these, owing to the irregular cooling of the metal, were found not to be equally strong in every part, and since the 16th c. they have generally been cast solid and the interior afterwards bored out.

Rifled C. are believed to have been in use as early as 1620, and breech-loading C. are said to have been used thirty years before that date.

Many of the early C. were of very large size and calibre, and were dignified with grand names—twelve cast by Louis XII. being named after the twelve peers of France, and Charles V. had twelve called the Twelve Apostles. In the 16th c. the size was reduced and general names adopted, such as C.-royal, or carthoun carrying a ball of 48 lbs.; bastard-C., or ¾-carthoun, 36 lbs.; ½-carthoun, whole culverin, demi-culverin, &c.—these again being superseded by names denominating the weight of the balls used, such as 9-pounders, 32-pounders, 68-pounders, and so on; or in the case of shell-guns by the diameter of the bore specified in inches.

At the present day we are reverting to the principles of construction, modified, of course, and improved in many respects, in use in the 15th c., and building or forging our C. from wrought iron, although other systems are also in use. Among the modern systems of gun-building may be mentioned the Arm-

strong, Whitworth, Palliser, and Krupp. In the Armstrong system an inner barrel of steel has successive coils of iron driven over it red-hot, which compress and support the inner barrel. The Whitworth C. are made wholly of steel, successive hoops of which are forced over each other by hydraulic pressure. In the Palliser method an inner lining of steel is surrounded by cast iron, and this system has been used for converting the old smooth-bore cast guns to rifled ordnance simply by boring out part of the interior and introducing a rifled steel tube. The Krupp guns are made of steel.

The bore and weight of C. are gradually being increased, and experiments have for many years been carried on by our Government at Woolwich, with the view of getting the most powerful weapon possible, and that will be able to pierce the armour of any ironclad ship that can be made. It is not long since people were astonished at the accounts of the experiments with the 'Woolwich Infant,' but this great gun is surpassed in size by one now (1876) in course of construction at Woolwich. The latter gun weighs 81 tons, the diameter of the bore is 15 inches, and the projectiles made for testing it weigh from 1250 to 1650 lbs. each. It is built on a modification of the Armstrong system. Modern C. are as a rule rifled, and a description of the different kinds of grooving employed will be found under RIFLED ARMS. Breech-loading C. have also been reintroduced, but only to a limited extent, and in the British service are again being abandoned in favour of muzzle-loaders.

Cannon-Ball Tree (*Couroupita Guianensis*), a large tree, belonging to the order *Lecythidaceæ*, a native of Guinea, and the hard woody shells of the fruits of which are used as drinking-cups.

Ca'no, Alonzo, a famous Spanish painter, sculptor, and architect, was born at Granada, March 1601. His works, conspicuous for breadth and vigour of design and rich colouring, are distributed among the provincial capitals of the country, but the 'Conception of the Virgin,' in the church of San Diego, Granada, is usually considered his masterpiece. He was appointed court painter and architect to the king in 1638–39, and from the great ability he displayed in three branches of the fine arts, his countrymen speak of him as the Michael Angelo of Spain. C. died 5th October 1665.

Canoe', a general name for a boat used by uncivilised tribes, and made by hollowing out, by means of fire or otherwise, the trunk of a tree. Boats of this kind have been discovered in old river-beds, and on the margins of existing lochs in the British Isles, to whose early inhabitants they doubtless belonged. Canadian canoes are very light, and easily carried from lake to lake, being made of the bark of *Betula papyracea*, sewed together with the fibrous roots of the white spruce, and coated with resin. The *kayak* of the Esquimaux is another kind of C., and consists of a frame wholly covered with seal-skins, except a small space amidships, in which the canoeist sits, and works a paddle about 7 feet long, with spoon-shaped extremities. The intrepidity which the Esquimaux display in venturing out to the open sea in these frail barks is remarkable. The Malays construct a peculiar boat or 'double C.,' which they propel with great velocity. It consists of a scooped-out trunk of a tree, 18 or 30 feet long, and 2 feet deep; to the upper edge a wash-board, 12 inches high, is sewed with coir fibre, and from one side two out-riggers, 12 or 18 feet long, spring out, carrying at their extremities a slightly curved log, whereby the boat is steadied and balanced. *Canoeing* is a form of boating which of late years has risen into favour in Britain, and in 1866 the 'C. Club' was formed in London to promote its cultivation.

Canoe Birch (*Betula papyracea*). See BIRCH.

Canoe Wood, the wood of the tulip-tree (*Liriodendron tulipifera*).

Canon, in music, a short Fugue (q. v.), in which all the following parts repeat exactly, and from end to end, the subject given out by the first. Its interest is commonly rather mechanical than musical.

Canon, in the usage of the Church, is a word of various import. 1. It denotes the *rule* (Gr. *kanōn*) according to which Christian belief is regulated. In this sense it is applied to the Scriptures of the Old and New Testament. (See BIBLE.) 2. It was used by St Paul (Gal. iv. 16) to denote the *rule* or law of Christian life generally: "And as many as walk according to this rule (*kanōn*), peace be on them and mercy, and upon the Israel of God;" but afterwards it received a more restricted ecclesiastical meaning, coming to signify rather the rules for the government of the Church as an institution. The collection and codification of these at a later period produced what is known as C. Law (q. v.). 3. It denotes a particular rule followed by those persons who devote themselves to a religious life. 4. The name is given to the persons themselves. The office of C. appears to have been instituted in the 8th c., and arose from the desire to impose something like a monastic rule on the cathedral clergy. The oldest rule was an adaptation of that erroneously ascribed to St Augustine. The functions of canons were to assist the bishop in the government of his diocese. All canons, however, were not monastic in their mode of life. We read of canons *secular*, as well as canons *regular*. The former mixed more with the world, exhorted the parish clergy, and devoted part of their time to the instruction of the laity. The only Reformed Church in which the order continues to exist is the Church of England, in which they form the bishop's chapter, and are (at least in theory) his advisers in all ecclesiastical matters; but there is no longer a reason for the name.

Canon'ical Hours (1) means the daily round of praise and prayer observed in the Christian Church from very early times, which was as follows: Nocturns or Matins, before daybreak; Lauds at daybreak; Prime at six o'clock (the first hour); Tierce at nine (third hour); Sext, at noon (sixth hour); Nones at three (ninth hour); Vespers in the evening; Compline or Completorium (completion) at bedtime. As Lauds was generally joined to Matins, these eight were practically seven. Nowadays, except in monasteries, the C. H. are either not all observed, or the offices are said by aggregation. 2 In England, C. H. means between 8 and 12 A.M., during which time alone a marriage in a parish church is legal.

Canon'icals, the proper official dress of the clergy, so called because fixed by the *canons* or rules of the Church. See VESTMENTS.

Canonisa'tion is the judgment of the Church pronouncing those to be in a state of bliss who in their lifetime gave convincing proofs of virtue by miracles and other means. The earliest form of C. was praying for a martyr at the celebration of the Eucharist, an altar often being erected over his grave. For this purpose the names of martyrs were inserted in the *canon* of the Mass, and hence the name. The power of C., which at first was possessed by each bishop, was gradually assumed by the popes, and has been exclusively exercised by them since the latter half of the 12th c. The honours of canonised saints are these: They have their names recited in litanies, invocations addressed to them, churches dedicated to them, their festival observed, their pictures decorated with the aureole, and their relics exposed for veneration.

Canon Law is a collection of ecclesiastical constitutions formed from the opinions of the Fathers and Popes, and from the epistles of the Holy See. The C. L. has been greatly deferred to in the Roman Catholic countries of Europe; but in those its operation has from time to time been modified to suit the spirit of the age by the *concordats* (see CONCORDAT) entered into between the governments of those countries and the pope. Framed by the priesthood, the gist of the C. L. is to establish the supremacy of the ecclesiastical authority over the civil power; hence in England there has never been any disposition on the part either of lawyers or of statesmen to defer to its authority except in matters purely ecclesiastical. In Scotland again, where the Presbyterian spirit is dominant, the C. L. has been treated with greater deference. 'So deep hath this C. L. been rooted,' says Stair (*Institutes of the Scotch Law*), 'that even where the pope's authority is rejected, yet consideration must be had to these laws, not only as those by which Church benefices have been erected and ordered, but as likewise containing many equitable and profitable laws, which, because of their weighty matter, and their being once received, may more fitly be retained than rejected.' The following are the chief collections of the C. L.: *Gratian's Decree*, a collection begun A.D. 1114 by Ivo, Bishop of Charters, and revised by Gratian, a Benedictine monk, A.D. 1150. It comprises ecclesiastical legislation from the beginning of the 4th to the end of the 12th c., the Decretals, being a collection of canonical epistles by the popes, assisted by the car-

dinals, in five books. They were published about the year 1230 by Raimundus Barcinus. In A.D. 1298 Boniface VIII. added to these a sixth book, which he called *Sextus Decretalium*. This was followed by the *Clementines*, or constitutions of Pope Clement V., published A.D. 1308, the *Extravagants* of John XXII. and later popes.

These form the *Corpus Juris Canonici*, received and administered by the Church of Rome.

Canonry, the office, rights, and benefice of a Canon (q. v.).

Canons, Book of, a code of rules which Charles I., in his attempt to establish Episcopacy in Scotland, sought to impose, along with a liturgy, on the Church of Scotland. The storm of popular indignation which was produced among the Presbyterian party in consequence led to the drawing up of what is known as the National Covenant (q. v.).

Canons of the Church of England, forming the ecclesiastical constitution by which that Church is governed, were passed in the convocation which met immediately after the Hampton Court Conference (q. v.). They are said to have been collected by Bancroft, Archbishop of Canterbury, from the canons of the ancient Church, and from the acts and injunctions of convocation, during the reigns of Edward VI. and Elizabeth. They were sanctioned by the king, but not carried through Parliament, so that they are not laws of the land, are not binding on the laity, and are so on the clergy only by virtue of their oath of canonical obedience.

Cano'pic Vases, vessels in which the viscera of embalmed bodies were put by Egyptian priests. They used four for a single body, and on the lid of each was the head of the deity who presided over the special contents. In the first were the stomach and larger intestines; in the second, the smaller intestines; in the third, the lungs and heart; and in the fourth, the liver and gall-bladder.

Cano'pus, or **Cano'bus**, a town of ancient Egypt, on the same tongue of land with Alexandria, till the building of which it was the chief harbour of the Delta. The ancient geographers fixed the dividing line between Africa and Asia at C. As a great maritime entrepôt, and the resort of sailors and foreigners, it was notorious for its profligacy. Its decline began with the rise of Alexandria.

Canopus, a bright star of the first magnitude, in the southern hemisphere, situated about midway between Sirius and the S. Pole, and forming a straight line with Achernar and Fomahand, two other first magnitude stars, the former of which is the centre one.

Canopy (Fr. *canapé;* Rabelais has *conopée*, from Lat. *conopeum*, Gr. *kōnōpeion*, a net spread over a bed to keep off gnats, *kōnōps*, a gnat) is now used to mean any kind of covering, from the 'C.' of heaven down to the projecting part of the head of a bedstead.

In *architecture* the term is applied to any covering above a throne, niche, statue, tomb, &c. As an architectural feature the C. was known at a very early date, yet its style is scarcely earlier than the Decorated or Perpendicular. It consists of a roof supported by pillars or attached to the wall, and is usually ornamented with an elaborately carved border. Perhaps the most splendid canopies known are those of the cathedrals of Chartres and Bayeux in France, but good examples also occur in the cathedrals and larger churches of England.

Cano'sa de Puglia, a town in the province of Bari, S. Italy, on the Ofanto, with a pop. of 12,900. It is the Apulian *Canusium* founded by the Greeks, and was a flourishing place of trade till the second Punic War. It has still a triumphal arch and a ruined amphitheatre, and in the vicinity were discovered splendid rock-cut tombs in 1812-13. In these were found many splendid antiquities, now in the Royal Museum at Naples, comprising painted vases, weapons, utensils, statues, coloured busts, and jewelled ornaments. See Millin, *Description des Tombeaux de C.*, with illustrations (Par. 1813).

Canossa, a village in the province of Reggio-Emilia, N. Italy, 10 miles S.W. of Reggio, rose round a mountain stronghold famous in the middle ages, of which the ruins still exist. Here King Lothar's widow was besieged by Berengar II. in 951, when the Emperor Otto the Great sought her hand and the throne of Italy. In the 11th c. the castle belonged to the Countess Matilda of Tuscany, the friend of Gregory VII., and in its courtyard the German Emperor, Heinrich IV., did his memorable penance in 1077.

Cano'va, Antonio, a famous Italian sculptor, son of an architect and marble-worker, was born in Venetia, at Possagno, 1st November 1757. At the age of fourteen he was taken to Venice, and, through the influence of Giovanni Faliero, was admitted as a pupil into the studio of Bernardi Torretti. His earliest finished productions, executed in boyhood, are two baskets of fruit and flowers, carved in marble, for his patron Faliero, and still shown in Venice. He modelled his 'Orpheus and Eurydice' at his native village in the evening, while attending the Academy at Venice during the day. About this time also he was partially employed upon busts, and shortly afterwards he modelled his beautiful 'Daedalus and Icarus,' after which he began to find himself famous. Sent by his friend Faliero to Rome in 1779, when he was still a young man of twenty-two, he produced his 'Apollo,' his first ideal statue, and 'Theseus and the Minotaur,' an extraordinary work for the time, and an embodiment of the artist's feeling for the purer principles of his art, both in composition and execution. He was selected to design the monument to Pope Clement XIV. for the Church of the Holy Apostles at Rome, and his great success with this work definitively established his claim to the highest rank as a sculptor. He then rapidly produced his 'Cupid and Psyche,' 'Hercules and Lycas,' the 'Graces,' 'Statues of Nymphs,' 'Endymion,' a charming statue of 'Hebe,' 'Venus and Adonis,' besides a great number of heroic, allegorical, and religious works, together with busts and monuments. On the fall of Napoleon, C. was sent to Paris by the Roman court to secure the restoration of the artistic treasures of which Italy had been plundered. He was created a marquis (d'Ischia) on his return, and received a pension, which he generously spent on less fortunate artists. C. died at Venice 13th October 1822. A number of his finest works, including the seated statue of the mother of Napoleon, and the bust of the emperor himself, are among the chief attractions of the gallery of Chatsworth, the property of the Duke of Devonshire. After Michael Angelo and Bernini, C. is the third great Italian sculptor who created a new era in the art, and raised his country to the foremost rank as a school for sculpture. His great effort, and one in which he met with splendid success, was to go back to the truth and freedom of the antique world. But his muse was softer and more luxurious than that which inspired the Greek and Roman sculptors, and accordingly, where we should expect, superadded to the truth and purity of nature, something of the broad and simple treatment of the ancients, we find, especially in the later works of C., a slight suspicion of affectation and sentimentalism. See Quatrèmere de Quincy, *C. et ses Ouvrages* (Par. 1834); also the biographies of C. by Missirini (2 vols. Prato, 1824), Cicognara (Ven. 1823), Rossini (Pisa, 1825), and d'Este (Flor. 1864).

Can'robert, François-Certain de, Marshal of France, was born 27th June 1809. After studying at the military school of St Cyr, he entered the army in 1828. He distinguished himself greatly in Algeria, commanding several expeditions, one of which destroyed the Arab stronghold of Narah, and rose to be a general of division. C. espoused the side of Louis Napoleon at the time of the *coup d'état*. In the Crimean war, he was at first second in command of the French army, his chief being Marshal St Arnaud, and on his death succeeded him. He was slightly wounded at the battles of Alma and of Inkermann, and in 1855 resigned the chief command to General Pelissier. In 1856 he was raised to the dignity of Marshal of France. In the war against the Austrians in 1859, C. had the command of the Third Army Corps, and contributed largely to the victories both of Magenta and Solferino. At the beginning of the war with Germany in 1870, he again had the command of an army corps, and, along with Generals MacMahon and De Failly, was beaten at Woerth on the 6th August of that year. He was shut up with Bazaine in Metz, and on its capitulation was sent as a prisoner into Germany. Since the conclusion of the war, C. has taken no active part in French politics, but is understood to loyally support the government of MacMahon.

Can'so Strait, a little-frequented channel between Chedabucto Bay and the Gulf of St Lawrence, is about 2 miles broad and 17 long. C. Cape is the most easterly point of Nova Scotia.

Can'statt (official), or **Cann'stadt**, a town of Würtemberg, Germany, on the Neckar, here crossed by a bridge. It is 2½ miles N.E. of Stuttgart by rail, lies in a beautiful district, and has forty mineral springs, of a mean temperature of 16° R. It is the centre of the Neckar trade in fruit and wine, and has a parish church of 1471, a large town hall, a fine railway station, and a royal theatre (1839). In the vicinity are many splendid villas, of which the chief is Wilhelma, built by King Wilhelm in 1842-51. C. has manufactures of cotton and woollen goods, yarn, machinery, steel, oil-cloth, &c. Pop. (1872) 11,804.

Cant, a name given to certain obliquely placed timbers near the bow and stern of wooden ships. In the constructive arts generally, any piece placed obliquely or askew is often said to be canted.

Cant, Andrew, a pugnacious Scotch divine of the 17th c., was minister first in Pitsligo (1638), then in Newbattle, near Edinburgh, and afterwards (1640) in Aberdeen. He took an active part in securing the subscription of the National Covenant in the north country, went with the Scotch army into England when it marched against Charles I., and preached before that monarch in Edinburgh in 1641. Finally, C. made Aberdeen too hot to hold him by denouncing both with tongue and pen certain of his congregation, and had to relinquish his charge. He died about 1664. There are some anecdotes about C. in Wodrow's *Analecta*.

Cantab'ile, an Italian word used as a mark of musical expression, and denoting that a piece or phrase is to be performed in a smooth *singing* manner.

Canta'brians, a wild highland people of ancient Spain, of Iberian origin, whose descendants now occupy the region in the N. of Spain, stretching along the Bay of Biscay (see BASQUE PROVINCES and BISCAY). They were compared to the Scythians and Thracians in barbarism. In war they were distinguished by great bravery, especially in their six years' (25-19 B.C.) contest with the Romans, by whom they were first called C. Augustus himself began this war, which was mainly of a guerilla character; and it was ended by Agrippa. Later, Tiberius attacked their towns. The C. were never entirely conquered, the great part of them falling back on the refuge of the mountains. Their towns were eight in number, and of these the best known were Juliabriga, near the source of the Ebro (*Iberus*), Vellica, and Concana. From them the Bay of Biscay was called the *Mare Cantabricum*, and the range which separates their fertile country in the S. from the bare Castilian plateau, the *Montes Cantabrici*.

Can'tal, a mountainous department of Central France, formed out of Upper Auvergne, and named from the Plomb-du-Cantal, a mountain 6095 feet high, nearly in its centre. Area, 2216 sq. miles. Pop. (1872) 231,867. It is watered by the Dordogne and other streams. Only about one-third of the surface is arable, and the grain produced is not equal to the consumpt; but the mountain pastures are excellent, and feed numerous herds of horned cattle and flocks of sheep, whose wool is in high estimation. Its horses, small but strong, are much in request for the cavalry service of the French army. The famous Roquefort cheese (*frommages de Roquefort*) is made in this department. The manufactures are few and of small importance. The chief town is Aurillac.

Cantari'ni, Simone, surnamed *Il Pesarese*, an Italian painter, born close to Pesaro in 1612. Having seen three pictures by Guido, he resolved to study and to rival that master, and with this view went to Bologna, entered Guido's studio, and soon surprised the great painter by his talent. Proud and contemptuous of others, he made the artists of Bologna his enemies, went to Rome, studied the antique and the works of Raphael, and afterwards visited Mantua on the invitation of the duke. Quarrelling with his new patron, he left for Verona, and died or was poisoned there in 1648. He excelled Guido in grace of conception, painted hands and feet faultlessly, and was true in colour, though his tone was low and grey. His head of 'Guido' (Bologna), 'San Antonio' at Cogli, and 'San Jacopo' at Rimini are masterpieces. Many of his etchings on copper have been sold as those of Guido.

Canta'ta, a musical composition. The nature of the composition which has received this name has varied very much at different times; what is called a C. at present is commonly a secular oratorio, or opera without action, such as *Acis and Galatea*, or Sterndale Bennett's *May Queen*. A 'sacred C.' is generally a short or simple oratorio.

Canteen', a word of three distinct meanings. 1. It denotes an establishment in barracks for the exclusive use of troops, to supply them with wine, malt liquors, groceries, and other articles of food, although no soldier is obliged to buy anything at a C. The sale of ardent spirits is strictly prohibited at home stations, but abroad is permitted at the discretion of the officer in command. There is the garrison, the brigade, and the regimental C., which used to be under the control of civilians called C.-tenants, but are now managed by a standing committee of three officers as contractors, with a C.-sergeant as salesman. The latter, who may be a staff, colour, or any other sergeant, has to take out a licence, and his maximum pay is 6s. a day. By the latest C. regulations (August 1872), it was agreed that pensioned non-commissioned officers might be appointed C.-sergeants as a tentative measure, for two years. This arrangement is now made permanent. The profits of the C. are expended on the soldiers and their families. For the regiment they may be spent on newspapers and other provisions for the reading-room, theatricals, skittle-alleys, regimental gardens, prizes for athletic sports, extra messes at Christmas, refreshments on field-days, and other strictly regimental purposes. As one instance, the profits divided in the 1st Royal Scots for the four years 1871-74 averaged £120 each year. In the last of these years £5 were distributed among the single men of each company, and every family received a proportion according to the number of its members. 2. A C. denotes a vessel, sometimes of tin, sometimes of wood, which holds about three pints, and is used for carrying whatever beverage the soldier may require, or be able to obtain, on the march or in the field. In the British army it is usually made of oak, painted blue, and slung over the shoulder. 3. The name C. is also given to a square chest, made of leather or wood, and divided into compartments, in which military officers on foreign service pack a variety of articles of plate and other table equipage.

Can'terbury, an ancient cathedral city of Kent, a county in itself, the metropolitan see of all England, and, under the new army regulations, the cavalry dépôt for the whole country, is situated on the Stour, 50 miles E.S.E. of London by the London and Dover road, 81 miles by the South-Eastern, and 61 miles by the London, Chatham and Dover Railway. Besides the cathedral, C. has twenty churches of the Establishment, and among its modern buildings are a fine public museum, extensive barracks, a large military hospital, and a new theatre. In the old church of St Martin, built in the 12th or 13th c., Roman bricks and Norman sculpture have been worked up in the walls. In the church of St Dunstan is the Roper vault, in which the head of Sir Thomas Moore was buried by his daughter Mary Roper. In 1835 the vault was opened, and the head discovered and identified. St Augustine's Monastery, burnt in 1168, was appropriated as a royal palace by Henry VIII., was the residence of Lady Wotton during the rebellion, remained long in the possession of her descendants, and in 1844 was purchased by J. Beresford Hope, Esq., to be afterwards presented to the archbishop, and eventually converted into a missionary college. The Dane John or Donjon is supposed to have been the keep of a fortress still traceable. There are Blue-Coat, Grey-Coat, and other schools.

Corn and hops are extensively grown in the surrounding district, and there is considerable trade in these and in wool, cattle, and brawn, which is largely manufactured here. There are also extensive breweries, iron-foundries, coach-factories, rope-walks, and brick-fields. The city returns two members to Parliament. Pop. (1871) 20,962. C. was in existence before the commencement of the historical period in Britain. Its oldest British name was probably *Durwhern*, whence the *Durovernum* of the Romans; but latterly it was called by the British *Caer-Cant* (city of Kent, Kent probably meaning 'headland'), whence its Latin name *Cantuaria*, and the Old Eng. *Cantwara-byrig*, mod. C. Probably it was a place of some importance during the Roman occupation, from its position at the junction of the military roads from Dover and Lympne, the principal Roman havens. It afterwards became the capital of the Jutish kingdom of Kent, and here Augustine baptised Æthelberht, and laid the foundation of English Christianity. The city suffered severely from the

Danes in the 9th, 10th, and 11th centuries. Its later history is bound up with that of its magnificent cathedral.

Cathedral of C.—Augustine (according to Bede, *Hist. Eccl.*, lib. i. c. xxxiii.), the first Archbishop of C., repaired a church which was said to have been built by Roman Christians, consecrated it in 602, and named it Christ Church. Cuthbert, the eleventh archbishop, built the church of St John, close to, and almost touching Christ Church, in 758, and obtained an order from Pope Gregory to the effect that thenceforth all the archbishops of C. should be buried in their own church. From this time the shrines and relics, and consequently the fame and wealth, of the growing cathedral began to increase. In 891 Plegmund, the nineteenth archbishop, 'bought the blessed martyr Blasius for a great sum of gold and silver' at Rome, brought the body to C., and placed it in Christ Church. Odo, the twenty-second archbishop (940-60), raised the walls of Christ Church, reroofed the building, and enriched it with the famous relics of St Wilfrid and St Audeon, by virtue of which many miraculous cures were performed. The head of St Swithin was shortly afterwards added. In 1011 the town and the cathedral were sacked and fired by the Danes, but rebuilt or restored (about 1023) under Canute, who, according to Gervasius, 'gave to Christ Church his crown of gold, which is still kept at the head of the great cross, in the nave of the same.' In 1067 the cathedral accidentally caught fire, and both Christ Church and St John's, in which the archbishops were buried, together with nearly all the monastic offices, were consumed. In this conflagration nearly all the ornaments and books, together with a vast number of papal bulls and seals, were destroyed. Lanfranc, Abbot of Caen, was appointed Archbishop of C., and commenced his rule in 1070. This energetic and accomplished prelate brought with him all the architectural skill and taste of the Norman. He razed the old building to the ground, dug out its foundations, built a new and noble church, with offices, &c., on the old site, and replaced the bodies of St Dunstan and St Elphege, together with the relics of the saints, in the new building. His successor, Anselm (1093), appointed Ernulf his prior. Ernulf took down the E. side of Lanfranc's church, and rebuilt it much more magnificently, with splendid painted glass windows, marble pavements, and pictures. Ernulf's work was continued by his successor Conrad, under whom that part of the church which extends to the E. of the great tower was constructed. The church thus founded and finished by Lanfranc, but enlarged under Anselm, was dedicated by Archbishop William, May 4, 1130, in presence of Henry, King of England, David, King of Scotland, and all the bishops of England. In 1174 the cathedral took fire, and its walls and columns were much weakened. French and English artificers were summoned to examine and report upon the building, and finally the work of restoring it was confided to a French workman, Guillaumê of Sens, in Champagne. After labouring for five years, Guillaumê was hurt by a fall, and the superintendence of the works, Gervasius tells us, came into the hands of one 'William by name, English by nation, small in body, but in workmanship of many kinds acute and honest.' The restoration was completed and the structure roofed in 1184. Great part of the cathedral remains substantially unaltered from the time of the second William to our own day. Henry di Estria, prior from 1285 to 1331, 'decorated the choir of the church with most beautiful stonework, delicately carved.' Becket's crown, at the eastern end of the cathedral, was erected during the life of the great archbishop, and after his assassination in the N. transept—a spot known afterwards as the *Martyrium*—in 1170, a splendid shrine was erected in his honour. It consisted of stonework about 6 feet high; but its upper portion was a wooden framework overlaid with plates of gold, and enriched with jewels, pearls, &c. Within the upper portion the bones of Becket were kept in an iron chest. A pilgrimage to this spot was the most popular act of piety in England during the middle ages:—

'Thanne longen folk to gon on pilgrimages,
And palmers for to seeken straunge strondes
To ferne halwes, kouthe in sondry londes;
And specially, from every schires ende
Of Engelond, to Caunterbury they wende,
The holy blissful martir for to seeke,
That hem have holpen whan that they were seeke.'
Prologue to Chaucer's *Canterbury Tales*.

The shrine was demolished by order of Henry VIII., and the bones of St Thomas publicly burned in 1538. The nave, the transepts, and the pillars of the central tower were all built during the same period—the end of the 14th and the beginning of the 15th c. The central tower, or Angel steeple, was built by Thomas Goldston (prior from 1495 to 1517). The cathedral unites in itself examples of every style of architecture that has flourished in England. The later additions and restorations are in the Perpendicular style, but the mass of the building is Norman or Early English. The form of the structure is that of a double cross, 545 feet long and 71 feet broad, and it is surmounted by a magnificent central tower 235 feet high. The bell tower is regarded as one of the most beautiful specimens of Perpendicular architecture in England; the choir, 200 feet long by 38 feet broad, is the most spacious in the country, and the crypts are unique for extent and altitude. Among the most remarkable tombs are those of the Black Prince, Lady Mohun, Henry IV. and his queen, Margaret Holland and her two husbands, John, Earl of Somerset (died 1410), and Thomas, Duke of Clarence (died 1420), Isabel, Countess of Athol, and nearly sixty archbishops. See *Architectural History of C.*, by Willis (Lond. 1845).

Canterbury. See New Zealand.

Canterbury Bells. See Campanula.

Cantharell'us. See Edible Fungi.

Canthar'idine is a crystalline substance contained in the cantharidis beetle or *Spanish fly* (*Cantharis vesicatoria*), and appears to occur in greatest abundance in the head and antennæ of the insect. The composition of C. is expressed by the formula $C_5H_6O_2$. Taken internally, even in small quantity, C. acts as a violent irritant poison, particularly affecting the bladder and sexual organs. Applied externally, it causes blistering of the skin, and is used for that purpose in medicine (*fly-blisters*). In rare cases C. is employed as a medicine.

Can'tharis (pl. *Cantharides*, Gr. 'little flies') **vesicatoria,** the blistering beetle or Spanish fly, is an insect belonging to the order *Coleoptera* (q. v.). Several species of the genus C. possess blistering properties, but the only one used in medicine is C. V. This is a small beetle nearly 1 inch in length, of a bright green colour, and emitting a nauseous odour. The body is covered with whitish hairs. The head is large and somewhat heart-shaped; the thorax, about the size of the head. The wing-covers (*elytra*) are of a shining green. So marked is this colour that, when reduced to a fine powder, it can easily be detected; and, even in poisoning with C., the shining particles are perceptible in the substance vomited. C. is found in most European countries, especially Italy and Spain, and occasionally in England. The insects are collected for medicinal purposes chiefly in Hungary. The season when this is done is May, and the mode adopted is to spread cloths under the trees on which they are found, and to violently shake the trees. The operation is performed in the morning or evening, when the beetles are less active. The collectors cover their faces with veils, and wear gloves on their hands, to keep them from being blistered. The cantharides are then killed by exposing them to the vapour of vinegar, hot water, or turpentine, and are afterwards dried in the sun. They require to be kept in well-stopped bottles, being liable to the attack of mites. A few drops of strong acetic acid is the best means of preserving them. Blistering flies have been used in medicine for more than 2000 years, but the evidence is very conclusive that it was not the genus C. that was used, but a different insect.

When applied to the skin, C. speedily produces redness, and in ten or twelve hours a blister. It forms the active ingredient of the well-known '*fly-blister*' (see Blisters), composed of C., mixed with yellow wax, suet, lard, and resin; is also the chief ingredient of all blistering fluids, and is a principal constituent of most stimulant hair-washes. When swallowed, it is an irritant poison, to which there is no known antidote. The treatment considered the best is to use emetics for the purpose of emptying the stomach, to give opiates to relieve pain, and soothing drinks, as barley-water. C. has a special action on the kidneys, and, whether taken internally or applied as a blister, is apt to cause the urine to be bloody.

Can'thium, a genus of plants belonging to the natural order *Cinchonaceæ*. *C. parviflorum* is used for making fences in India, and the leaves as an ingredient in curries.

Can'ticles (Lat. 'little songs'), a book of the Bible, called in the authorised version the Song of Solomon, in Hebrew the Song

of Songs. 1. As to its authors, the tradition that it is the composition of Solomon has been called in question, and thought to be in the highest degree improbable by not a few modern critics. 2. As to the meaning, the favourite mode of interpreting it has always been (1) the *allegorical*, according to which it describes, in the language of love, the relations existing between Jehovah and the people of Israel, between Christ and the Church, between Ezra and the ten tribes, Solomon and Wisdom, the active and receptive intellect (scholastic), &c. Another mode is (2) the *typical*, according to which it describes the marriage of Solomon with (*a*) Pharaoh's daughter, or (*b*) an Israelitish woman. According to (3) the literal school of interpreters, it consists of a number of erotic songs, and as a whole is intended 'to display the victory of humble and constant love over the temptations of wealth and royalty.' See *The Song of Songs*, by Ginsburg (1864).

Cantire′, or **Kintyre** (Gael. 'headland'), a peninsula forming the southern part of Argyleshire, 40 miles long, with an average breadth of 6½ miles, and lying between the Firth of Clyde and the Atlantic Ocean. It contains numerous small lochs and moorish hills of no great elevation. Dairy-farming is attended to rather than agriculture; the herring, cod, and ling fisheries are important, and the distilling of whisky is carried on extensively in Campbelton (q. v.). There are numerous small ecclesiastical remains, several vitrified forts, and perpendicular crosses of slate, rudely carved and inscribed. Pop. about 18,000. C. was the seat of the earliest Scoto-Irish colony (6th c.), and in the dim semi-historic records of their progress it occupies a more important position than it has ever since done. As one of the first homes of Christianity in Pictland, it soon abounded with chapels and monasteries, and only began to lose its importance when the seat of the Scottish monarchy was removed to Forteviot in the 9th c.

Canto Fermo, in church music, *Plain Song* (q. v.).

Can′ton (properly *Kwang-tung*, or *Kwang-tung-chu-fu*, 'the metropolis'), the capital of a province of the same name, in the S. of China, on the left bank of the Chu-Kiang (Pearl river), or C. river, which is formed by the union of the Si-, Pe-, and Tung-Kiang (W., N., and E. rivers), and which, below the town, separates again into a multitudinous network of streams, entering the sea chiefly, however, by one great estuary. The river narrows into the Bocca Tigris (q. v.) before expanding into this estuary, at the mouth of which lies Macao (q. v.) on the W., and Hong-Kong (q. v.) on the E. C. is 90 miles from the sea, and is surrounded by a brick wall, raised on a sandstone base, and which has a height of 25 feet, a thickness of 20, and a circumference of 6 miles. It is traversed by another wall from E. to W., dividing it into the old or Tartar town in the N., and the new or Chinese town in the S. The former of these walls is pierced by fifteen, the latter by four gates. The town is intersected by many canals, on which there is much active trade, and on both sides of the river there are several large suburbs, the principal ones being Honan, on an island of the same name, and the great maritime colony of Tankia. The number of boats on the river has been estimated at 84,000, and the boatmen at 300,000. The old town is badly built, and in the N. the houses give place to gardens and ponds. Confined by the S. wall to a distance of 300 feet from the river, the new town, which is the seat of the governor and of customs commissioners, has many fine shops, palaces, temples, schools, and promenades, but the streets are generally short, and only about 8 feet broad, although cleaner than in other Chinese towns. Many of the streets are entirely occupied by a single trade. Both C. and suburbs are well supplied with good spring water. The public buildings are more remarkable for their size than for architectural beauty. There are as many as 120 joss-houses or temples, to which are attached some 2000 Buddhist priests and nuns. In the old town there are two ancient pagodas, and a Mohammedan mosque, with a minaret 160 feet high. C. has three high schools, with 200 pupils each, besides some twenty inferior schools. Great numbers of the inhabitants are in the service of Europeans, with whom they communicate in a broken English jargon. C. was till 1857 the chief port of China open to foreign commerce. It has still an important trade, especially in the staples, silk and tea. In 1874 the total exports amounted to £4,610,470, and imports to £1,985,701, exclusive of treasure. In the same year the export of tea was £13,539,608 lbs.; of silk, £3,884,787 lbs. The C. tea has many of the finer qualities of those produced in the Foochow districts. Of the other exports the chief are sugar, preserves, cassia lignia, pottery, fans, fireworks, glass-wares, and matting; among the imports, opium, cotton and woollen goods, copper, iron, lead, steel, cutlery, &c. The chief kinds of opium imported are Malwa, Patna, and Benares, but the quantity is quite unknown, owing to the extent to which it is smuggled from Hong-Kong and other places. The import trade is almost entirely in the hands of native merchants. In 1874 there entered the port 701 ships of 345,433 tons, and cleared 793 of 347,069 tons. There is a vast river and coasting trade in junks. Hong-Kong is gradually but surely affecting the prosperity of C., for which it acts as a depôt or bonded warehouse. The steamers from Hong-Kong convey to and fro daily from 600 to 1200 passengers. Together with its suburbs, C. has a pop. of 1,000,000. Among the early traders with C. were the Arabs in the 9th, the Portuguese in the 16th, and the Dutch in the 17th c. About the close of the last-named century, the English found their way thither, and the East India Company gradually acquired a monopoly of the traffic, which only expired in 1834. The conduct of the *hong* merchants and the mandarins led to a war with England in 1840, which resulted in the *treaty of Nankin*, by which C. became one of the five ports opened to foreign commerce. The *province* of C. has an area of 79,456 sq. miles, and a pop. of 19,147,030.

Canton, in heraldry, is a Subordinary (q. v.). It is cut off by two lines, occupies a corner, either dexter or sinister, but most frequently dexter, of the shield, and is smaller than the quarter, being about a third in size of the chief.

Cantonnee, in heraldry, means placed in the canton quarter of a shield; also placed between four charges, such as scallop shells.

Canton (Fr. *canton*; origin unknown according to Brachet, but perhaps connected with the Ger. *kante*, a corner, seen in the English *Kent*) has a double meaning in geography. 1. In Switzerland it denotes a portion of territory which possesses a separate government of its own, but is at the same time a member of the National Confederation. The United States of America in some respects present a parallel to the Swiss Cantons. 2. In France the name is given to the subdivisions of an arrondissement.

Can′tonments, a military term, meaning, in Europe, farm-houses, villages, and towns in which an army finds rest or shelter during the intervals of active operation in a campaign. The soldiers are not under canvas in C. as they are in an encampment. The quartermaster-general selects a district of ample accommodation for the location of the troops; and around and throughout which main guards, pickets, sentries, barricades, and other precautions against surprise by the enemy, may be conveniently placed. In India C. are ordinary arrangements for the housing of soldiers during peace, but they are of slighter and less permanent character than Barracks (q. v.). There are excellent solidly-built barracks for officers and soldiers at Calcutta, Bombay, and Madras; but in almost all other parts of the country the regiments live in C., at which the soldiers are housed in huts they build themselves, and the officers have their Bungalows (q. v.), which usually skirt the parade-grounds. The mess-rooms of the officers, however, are within the lines of the C.—ball-rooms, theatres, and racket-courts are common at the larger stations, and a racecourse with its grand stand is a usual feature. There is always, also, a bazaar for the convenience of the native troops.

Canton's Phosphorus is an impure sulphide of calcium (CaS) prepared by heating calcined oyster shells with sulphur in a closed crucible. After exposure to light, it appears to glow when brought into a dark room. See PHOSPHORESCENCE.

Can′tu, Cesare, an Italian historian, born 5th September 1805, at Brescia, N. Italy. At the age of eighteen he was appointed Professor of Belles-Lettres at Sondrio, Valtellina; was imprisoned for a year for expressing Liberal ideas in his *Ragionamenti sulla Storia Lombarda nel Secolo XVII.* (Mil. 1842; 21st ed. 1864); and composed in prison *Margherita Pusterla* (Flor. 1845; 36th ed. 1864), an historical romance. His principal work is the *Storia Universale* (1837-42, Turin and Palermo, 9th ed. 1864). C. is also the author of some popular hymns, of the *Parnasso Italiano* (1843), *Storia degl' Italiani* (1859), *Milano; Storia del Popolo e pel Popolo* (1871), and other historical works.

Can'ute (originally Cnut, Latinised *Canutus*, Fr. *Canuté*, then by change of accent English C.), King of Denmark and England, succeeded his father Swegen on the Danish throne in 1014. He began his reign by ravaging the E. and S. of England, in revenge for the massacre of Danes perpetrated by Æthelred the Unready. The victory of Assandun and the death of Eadmund Ironside in 1016, who had bravely opposed him for a time, left him sole ruler of England. Although his rule opened with massacre and assassination, his conduct suddenly changed, and he governed for nearly twenty years with mercy, wisdom, and justice, making no distinction between Dane and Englishman. He conciliated the esteem of his subjects, and his reign was tranquil and prosperous. C. revived Dunstan's policy, built many churches and monasteries, and even made a pilgrimage to Rome. His favourite scheme was to weld Norway, Denmark, and England into a great northern kingdom. He died at Shaftesbury, 12th November 1035. A fragment of song which he is said to have composed while listening to the psalm of the monks of Ely, and which was sung for a hundred years after the Conquest, is still preserved :—

'Merie sungen the muneches binnen Ely,
Tha Cnut ching reu there by ;
Roweth, cnihtes, noer the land,
And here we thes muneches saeng.

See Freeman's *Norman Conquest*, vol. i. pp. 360 475.

Canvas, a strong, coarse, unbleached cloth made of hemp, and used for tent-coverings, sails of ships, &c. The term is derived from the classical and scientific name of the hemp plant, *Cannabis*.

Canvas (painter's) is prepared for taking on oil-paint by being *primed* or grounded, usually of a neutral grey tint. There are certain recognised sizes of C., as the *kit cat*, about 28 by 36 inches ; the *turn-quarters*, 25 by 30 inches ; *half-length*, 40 by 50 inches ; *Bishops' half-length*, 44 or 45 by 56 inches ; *Bishops' whole length*, 58 by 94.

Canzo'ne (Ital. a song, Lat. *cano*, 'I sing'), a form of lyric which originated in the Provençal *canso*, and was adopted and regulated by the Italians during the 13th c. From Petrarch, who gave it uniformity and polish, it was called *C. Petrarchesca*. It dealt with light and with solemn subjects, and consisted of several stanzas, of which the last was generally shorter than the others. In the *C. Anacreontica* considerable licence in rhyme and rhythm was permitted. The *C. Pindarica*, introduced in the 16th c., treated of loftier themes than the other canzoni, and was divided into strophe, antistrophe, and epode. This last form of canzoni was especially cultivated by Chiabrera, surnamed the Italian Pindar, many of whose canzoni are truly sublime.

Canzonet is, in Italian poetry, a C. of short verses ; in music, a song generally of two or three parts.

Caout'chouc, Gum Elastic, or **India-Rubber**, is an exudation obtained from the stems of many trees growing throughout the tropical regions. As it flows from the trees it is a milky juice, with the colour and consistency of thin cream, but it gradually thickens on exposure to the air, and becomes the tenacious, elastic body familiarly known as india-rubber. C. is a pure hydro-carbon, containing 87·5 per cent. of carbon and 12·5 of hydrogen, but two different principles are found in its constitution, one of which is solid, tenacious, and elastic, and little affected by solvents, heat, or cold ; while the other is viscid, ductile, and perfectly soluble in essential oil and other solvents. C. melts at a temperature of 248° Fahr., and if not submitted to a higher heat resumes its original properties on cooling, and it burns with a bright but smoky flame, emitting a rather acrid odour. The varieties of C. found in commerce are pretty numerous, differing as to the countries whence they come, their botanical source, firmness, and tenacity and purity. The following are the denominations under which the principal kinds come to the markets : Para 'bottle' and 'scrap,' Ceara 'lump' and 'scrap,' derived from *Hevea Guayanensis* and other species ; Honduras, Guayaquil 'pressed' and 'damp,' and W. Indian 'sheet' and 'scrap' from *Castilloa elastica ;* Assam or Silhet, E. Indian, and Singapore from *Ficus elastica* and other species ; Borneo or Gutta Susu from *Urceola elastica ;* Madagascar, a pale-brown firm rubber, from *Vahea Madagascariensis ;* and African 'tongue,' 'ball,' and 'niggers,' from various trees not yet satisfactorily determined.

The first specimens of C. brought to Europe were procured by M. de la Condamine in 1736, on his return journey from Peru by way of the Amazon. 'It is,' said M. de la Condamine, 'a most singular resin, as much by the use to which it is devoted as by its nature, which is a problem to our most expert chemists. It flows from a tree growing in several parts of America, and is called C. by the Mainas Indians on the banks of the Amazon.' In the N. of Quito he found the same resin obtained from a tree called Hyévé, from which the natives made a kind of waterproofed cloth, models of fruits, birds, &c., and boots ; while in another quarter he found that the natives fashioned it into a syringe-like bottle for holding liquids, whence the Portuguese colonists called the tree *Pao de Xiringa*. In 1770 Dr Priestley called attention to its value for effacing pencil-marks—a purpose to which it was originally devoted in England, whence its name, india-rubber.

Towards the end of last century, many attempts were made to discover a means of waterproofing garments with C., and for this purpose it was endeavoured to bring the material in its original liquid condition to Europe, but these efforts failed. The late Professor Syme of Edinburgh is said to have been the first to discover an efficient means of waterproofing ; but the introduction of the art is usually associated with the name of Mr Charles Macintosh, who obtained a patent for waterproofed cloth in 1823, and whose manufactures under the name of 'Macintoshes' soon attained an enormous reputation. Macintosh dissolved scrap C. in coal oil, or oil of turpentine, by trituration with heat in a close iron vessel, which produced a thick varnish. This varnish he smeared uniformly over one surface of the cloth to be proofed, and, after drying, a second, and then a third coating was given. Two webs so treated were brought face to face, and were made to adhere firmly to each other, so that the Macintoshed cloth had the appearance of a double texture of ordinary cloth, the waterproofing being entirely in the centre. The popularity of the Macintoshes soon waned when it was found to be injuriously affected by changes of temperature, becoming hard, stiff, and sonorous in cold, and in heat evolving an unpleasant odour of the solvent oil used in preparing the varnish. These objections were subsequently obviated by the process of vulcanisation (described below), and now waterproofed fabrics are chiefly prepared as single textures. A composition consisting of C. 33 parts, litharge 50, carbonate of lime 10, lampblack 2, and sulphur 5, is dissolved in 100 parts of benzine to form the proofing varnish. This is applied in very thin layers to cotton, woollen, or silk tissue, care being taken to evaporate the volatile oil between each application, and it is vulcanised by exposure to heat under a pressure of four atmospheres. Rubber rolled out into thin sheets is also applied for some kinds of waterproofing. In addition to clothing, waterproofed tissues are now employed for water-bags, cushions, beds, sheeting, &c.

While in England attention was being devoted to these uses of C., its elastic properties were being utilised in France, and MM. Rattier and Guibal developed the manufacture of elastic tissues in the form of cords, belts, bands, web, &c. They flattened the finest Para C. into broad thin discs by means of heat and pressure, which they then cut up into long bands, from which they cut threads by means of ingenious machinery, the threads being joined end to end by the native adhesiveness of the rubber. These threads are inelasticated by being stretched seven or eight times their proper length in reeling, and are left so stretched for about a week. It can then be worked up into any tissue, and its elasticity renewed by heating. Elastic web used for gusset boots and for many dress purposes, is still made of unvulcanised as well as of vulcanised rubber.

About the year 1842 Mr C. Goodyear, an American, discovered a process of treating and preparing C., by which its properties are so modified that it becomes in effect a new substance, and a powerful stimulus was thereby given to the C. industry. Mr Goodyear did not patent his process in England, and Mr Thomas Hancock of Newington, London, after a series of investigations, succeeded in producing the same effect by a process which he patented in 1843, and which afterwards became known as 'vulcanisation.' The process consists in combining from 2 to 10 per cent. of flowers of sulphur with C., under the influence of heat ranging from 270° to 300° Fahr. Under this treatment, C. assumes a grey aspect, it no longer softens, though it becomes more highly elastic with the application of heat, it does not sen-

sibly stiffen with cold, fresh cut edges do not adhere to each other, and it is not acted on by the solvents which reduce C. in its unvulcanised condition. The change effected by sulphur is explained on the theory that it combines with the soft or semi-fluid constituents of C., which thereby acquires greater consistency, and ceases to be affected by heat or cold or the solvents, all of which chiefly act on this constituent and the natural rubber. Vulcanisation is effected in several different ways, such as first by immersing sheet C. in flowers of sulphur heated to 235°, till it absorbs about $\frac{1}{12}$ of its weight, and then heating a short time to 300° Fahr. Second, by immersing the C. in a mixture of 100 of bisulphide of carbon, and 2·5 of chloride of carbon, and plunging it on withdrawal into water to decompose the excess of chloride of sulphur. Third, by powdering 100 parts of C. in rough laminæ, in a mixture of 4 parts of flowers of sulphur, and 50 of slaked lime, pressing it between rollers to incorporate the powder, working it up into fabrics, and exposing the finished articles for an hour to the action of steam.

When C. is combined with a much larger proportion of sulphur than is used for vulcanisation, under high heat and pressure a still greater change is produced in its physical characteristics, and we obtain the hard, black, horny-like substance known as vulcanite or ebonite. In the preparation of ebonite from 30 to 50 parts of sulphur are rolled up with 100 of inferior C. into a cake, and exposed for from seven to twelve hours to a temperature of 345° Fahr. under a pressure of five atmospheres. At the end of that time the compound is found to have become hard, solid, and black, capable of receiving a high polish, and fit to be used as a substitute for horn, whalebone, jet, ebony, &c.

A great proportion of C. as imported is in agglomerated masses of small shreds called 'scrap,' and in what comes as solid cake or bottle-rubber, many impurities and adulterations are usually present. The material must be prepared for manufacturing operations by being formed into pure homogeneous masses, and for this end it is cut up into small slices and washed in warm water. These washed pieces are passed repeatedly between iron rollers having indented surfaces and cutting edges, to which water is applied, and by alternate slashing, cutting, and squeezing, the rubber is purified and formed into solid homogeneous masses. These masses are pressed in moulds by screw presses, and are then ready for any of the above-detailed manufacturing operations. The operation of cleansing is called 'mastication,' from its similarity in method and effect to the chewing of india-rubber practised by schoolboys.

The variety of purposes to which C., alone or in combination, is devoted, and the forms it is made to assume, would defy enumeration. In its natural condition it is used as 'rubber' and for elastic web manufacture, though vulcanised thread is also much employed for elastic tissues. Paste or varnish of C. dissolved in spirits of turpentine or benzine is used in bookbinding and damp-proofing. Among the diverse applications of vulcanised C. may be enumerated springs and buffers, gas and water pipes, fire hose, door mats, playing balls, dolls, and other toys, tobacco pouches, washers, wringing cylinders, machine belting, life-belts, water and air proof bags, cushions, and beds, waterproof sheeting, and nursery appliances, &c. For many of these purposes the vulcanised C. is combined with one or more layers of woven fabric. Vulcanite or ebonite is used for insulators for telegraphic and electrical apparatus, combs, brooches, ornamental chains, crosses, &c., buttons, drinking vessels, funnels, chemical apparatus, speaking-tubes, stethoscopes, and generally for purposes to which horn and whalebone are applicable. Elastic tissues are besides applied to a great variety of useful purposes, both general and surgical, many of which readily suggest themselves.

Cap, a nautical term, meaning a strong, thick block of wood, holding two masts together, when one is erected at the head of another. When made of iron it is called a *crance*. C. also means a covering of tarred canvas at the end of a rope.

Cap of Maintenance is generally a cap worn by royal and noble persons on state occasions. Specifically it means a cap of state carried before a monarch of England at the coronation.

Capa'city, Legal, means the condition of an individual, making him or her fit for the application of the civil and criminal law. To some extent all have L. C. except the insane, but many classes have it only partially. Married women, aliens, infants—in Scotland minors and pupils—convicts, outlaws, have only partial L. C. See AGE, ALIEN, OUTLAW.

Cap-à-Pie', armed at all points (Fr. from *head to foot*).

Capar'isoned, in heraldry, is applied to a war-horse completely furnished for the field.

Cape (It. *capo*, and Fr. *cap*, out of the Lat. *caput*, 'the head') is the name given to larger promontories, as the N. C. (of Europe), C. Horn, C. of Good Hope, C. Comorin, &c. In this use it is synonymous with the Arabic *râs* (head), Scandinavian *näs*, Lowland Sc. *ness*, Fr. *nez* (nose), and Spanish *punto* (a point). The various capes requiring notice are described, not under *C.*, but under their proper names.

Cape, or properly **Vaunks River**, in Central America, after a course of nearly 300 miles, falls into the Caribbean Sea near Cape Gracios-a-Dios, whence its popular name. It is navigable for some distance from its mouth.

Cape Bre'ton, an island at the entrance of the Bay of St Lawrence, off Nova Scotia, from which it is separated by Chedabucto Bay and the Gut of Canso. It extends from N.E. to S.W., is 100 miles long, and 75 broad, has an area of 3120 sq. miles, and a pop. (1871) of 26,454. It has a steep rocky coast, much indented on the W., and in the interior there is a deep gulf, connected by the small Bras d'Or with the sea. The climate is healthy, and the surface fertile, especially along the Bras d'Or and the banks of the numerous small streams. The chief industries are agriculture, coal-mining, and fishing. There are considerable exports of coal, fish, and timber. Sydney is the capital, and among other towns are Port Hood and Arichat. C. B. was captured by the English from the French in 1745, then restored to France again, and once more taken in 1758. It was finally ceded in 1763, and was annexed to the province of Nova Scotia in 1820. See Browne's *C. B.*, 1871.

Cape Coast Castle, a fortified British settlement on the Gold Coast, Upper Guinea, with a pop. of 10,000. It is the centre of British trade in this region, and exports a considerable quantity of gold dust, palm oil, and maize. Here landed the troops sent out under Sir Garnet Wolsley in 1873 for the war with the King of Ashantee.

Cape Cod, a narrow peninsula of Massachusetts, U.S., 65 miles long, at the northern end of which is a revolving light, 155 feet above the sea level. C. C. Bay, 25 miles broad, opens to the N.

Cape Colony, named from the Cape of Good Hope, is the largest of the four S. African colonies, has an estimated area of 201,000 sq. miles, and a pop. (1868) of 636,158, and extends in lat. 28° 10'-34° 21' S., and long. 18° 29'-28° 20' E. It occupies the entire breadth of the S. extremity of the continent, and is bounded N. by the Orange River, E. in part by the Tees, a small tributary of the Orange River, by the Storm Berge, and by the Great Kei and its tributary the Indwe, S. by the Indian Ocean, and W. by the Atlantic. Its greatest length from N. to S. is 600 miles, and its breadth 450, while the coast-line has a total length of 960 miles. The principal inlets, proceeding from the W., are St Helena Bay, Table Bay, False Bay, Walker's Bay, St Sebastian's Bay, and Algoa Bay. The colony now consists of an E. and W. Province, each divided into sixteen electoral divisions, which in turn are subdivided for fiscal and magisterial purposes.

The interior of the country consists of tablelands which range from 1000 to 4000 feet high, and are encircled by a chain of mountains parallel to the coast, and distant from it about 150 miles. These mountains are named Roggeveld in the W., Nieuweveld in the S., and Storm Berge in the E. as they pass into Kaffraria. They have an average altitude of about 9000 feet, and their highest peak is Mount Compass (10,250) in the central range. From the coast the land rises to the base of this mountain chain in three successive terraces—the first reaching inland from 25 to 50 miles to the Little Black range; the second as much further, to the Great Black range; and the third, about 100 miles broad and 3000 feet high, forming the Great Karroo, a 'hard' plain, nearly bare for nine months in the year, but after the rains covered with grass and flowers (lilies, irises, amaryllis, &c.). The great river is the Orange or Gariep, which forms the N. boundary. Its principal southern tributary, the Fish River, rises in the Nieuweveld Mountains, and has a northerly course of 300 miles. The principal coast rivers, all inferior in length to the Fish River, are, in the W., the Elephant and Buffalo; in the S., the

Breede, Gauritz, Gamtoo, and Sunday; and, in the S.E., the Great Fish and Great Kei. The climate is exceedingly mild and dry, and the colony is singularly free from epidemic diseases. The mean temperature is 61° 26′ F. in the shade, and the annual rainfall about 25 inches. In the E. Province rain mainly falls in summer; in the Cape districts the reverse is the case, and long droughts are occasionally followed by heavy floods. June and July are the coldest months, and the warmest are December and January. All the land in the W. Province is specially adapted for the growth of wheat and other grains. Large tracts in the Cape districts have a highly productive soil of loam and clay mixed with gravel and decomposed granite. George, the maritime district which borders the E. Province, contains a great belt of forest lands. To the N. of the great mountain range are the splendid valleys of the Long Kloof, occupied originally by the large stock farms of the old Dutch proprietors, now miserably subdivided in the hands of their descendants. The soil of the E. Province is in great part fertile. A portion of Uitenhage is very productive. Albany and Victoria, two of the richest counties, embrace a fine variety of hill and dale and pasture lands. The districts to the N. of Grahamstown (the capital of the E. Province) are pastoral, and would require irrigation to render them fit for agriculture. In the extreme E. are the cereal-growing counties of Queenstown and British Kaffraria. Griqualand W. (q. v.), containing the famous diamond fields, was formally annexed in 1876, and the Transvaal in 1877. The fruits of temperate and tropical climes have been introduced into many of these districts.

The zoology of the colony has undergone great changes within comparatively late years. Wild animals have almost entirely disappeared, and in their place there is now abundance of sheep and cattle. Merino sheep and Angora goats are reared extensively, and a specialty is ostrich farming.

The mineral resources are known to be extensive and valuable, but have not been developed, or even explored, at all adequately. Copper is, however, actively wrought in the districts of the W., and the Namaqualand mines are among the richest in the world. Around Grahamstown iron is to be found in most of the hills, and among other minerals not yet disturbed are coal, plumbago, and marble, occurring in various places.

Of late years the commerce has steadily increased. In 1869 the value of the exports amounted to £2,139,689, and in 1874 to £4,138,838. The chief article of produce is wool, of which (1874) 42,620,481 lbs. were exported, valued at £2,948,571. In the same year the value of the export of copper ore was £321,434, and of ostrich feathers £205,640. There are also large exports of wine (*Cape* and *Constantia*), of goat and sheep skins, and of Angora hair. In the absence of navigable rivers, transit is at once difficult and expensive. The waggon-hire between Grahamstown and Port Elizabeth alone (100 miles) in 1872 amounted to over £600,000. Railways are now, however, being actively constructed; and in 1878 nearly 150 miles were open. The line between Cape Town and Worcester is to extend right through the heart of the colony. Lines are also begun to run from Port Elizabeth and E. London into the interior.

The form of responsible government established in 1853 was modified by an 'Ordinance Amendment Act' of 1872, by which the executive is vested in the governor and a council, composed of certain officials appointed by the crown. There is a Legislative Council of twenty-one representatives of the two provinces, ten of whom are elected for ten years, and eleven for five years. The House of Assembly consists of sixty-six members, who are elected by the towns and separate districts for a period of five years. Members of both bodies are elected by the same voters, the qualification of a voter being an income of £25 yearly.

The discovery of the Cape of Good Hope by the Portuguese in 1486 did not lead to any successful attempt to settle in the country. It was not till 1652 that the Dutch founded a small colony, which they gradually extended from the Cape to the Great Fish River. On the revocation of the Edict of Nantes (1685), great numbers of French Protestants came hither, bringing with them the vine, and giving name subsequently to many localities. In 1795 the Cape settlement was taken by a British naval force, but was restored to Holland by the Peace of Amiens. It was retaken in 1806, and permanently ceded to Britain at the Congress of Vienna. The first band of English settlers landed in Algoa in 1820, and had almost immediately to assert their position against the hostile and predatory Kaffirs (q. v.). Towards this race the Government adopted a shifting policy of alternate aggression and concession, which led to nine successive wars during the period 1812–53. A great exodus of the Dutch *Boers* (q. v.) to the Transvaal region was caused in 1836 by the injudicious manner in which their slaves were liberated, and by the restrictions placed in the way of recovering stolen cattle; yet the Dutch still form the majority of the colonists. British Kaffraria was joined to the colony in 1866, and part of Bassutoland in 1868. A rough classification of the inhabitants shows in all 185,000 Europeans, 80,000 Hottentots, 110,000 Kaffirs, and 137,000 other coloured races.

The confederation of all the S. African States, both English and Dutch, has been warmly advocated of late years. In 1875 the Imperial Government invited a Conference of Delegates on the subject, sending Mr J. A. Froude as its own representative. But local jealousies have led to the abandonment of the project for the present, though it is certain to be carried out. See the works of Napier (1849), Fleming (1856), Meidinger (1861), Wilmot (1863), and Mr Froude, *Official Report* (1876).

Capefigue′, Baptiste Honore′ Raymond, a journalist and historian, was born at Marseille in 1801. After studying law at Aix, he went to Paris in 1821 to complete his legal studies, but turned his attention to politics, and became editor of the Legitimist organ, *La Quotidienne*. This procured him a position in the Foreign Office, which he held till the revolution of 1830. Devoting himself to historical literature, C. had still free access to the archives of the Foreign Office till they were finally closed against him in 1848. His works are very numerous and interesting. One of the best is the *Histoire de la Restauration* (3d ed. 1842); two of the latest are *Les Derniers Jours de Trianon* (1866), and *La Duchesse de Burgogne et la Vieillesse de Louis XIV.* (1867). He died December 1872.

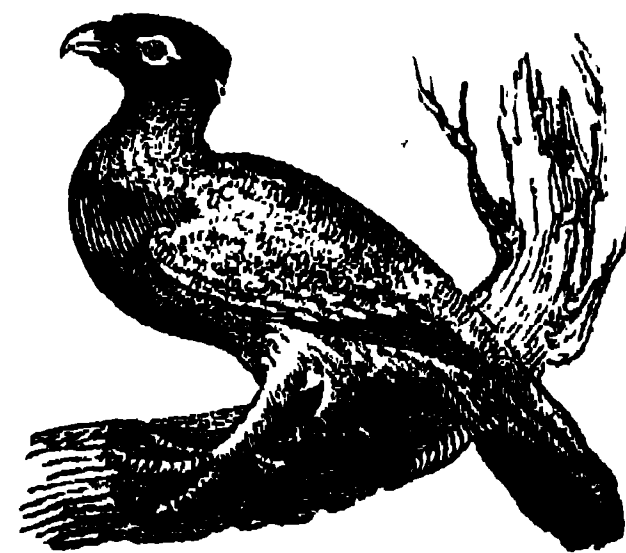
Cap′elin, a *Teleostean* fish belonging to the *Salmonidæ* or Salmon family, and scientifically known as the *Mallotus Groenlandicus*. It is of small size, and somewhat resembles the Smelt (q. v.). It is employed as bait by the Newfoundland cod-fishers, and it has also been imported in a preserved state into Britain. These fishes chiefly occur on the Newfoundland and N. American coasts, and sometimes appear in large shoals.

Capell′a, a star of the first magnitude in the constellation Auriga, nearly midway between Orion and the Pole-star, but nearer the latter. C. is also the mythical goat (*Amalthæa*) that suckled Jupiter in his infancy.

Capella. See ACAPELLA.

Capell′a, Martia′nus Mineus Felix, styled in MSS. *Afer Carthaginensis*, a celebrated encyclopædist, flourished probably about the close of the 5th c. Of his life we only know that he was educated, if not born, in Carthage. His *Satiricon*, a grotesque medley of prose and various kinds of verse, and full of ill-arranged and ill-digested learning, is divided into nine books, and furnishes occasionally some curious and useful information from works that have long since perished. C. seems to have anticipated, in his eighth book on astronomy, the theory of Copernicus as to the sun and not the earth being the centre of our system. The first edition was published at Vicenza in 1499; that of Grotius, who wrote his commentary when a boy of only fourteen, at Leyden, in 1599; and that of Kopp, by far the best, at Frankfurt, in 1836.

Capercail′zie, Wood Grouse, or Cock of the Woods (*Tetrao Urogallus*), a species of Rasorial birds included in the Grouse family (*Tetraonidæ*), once abundant in the Scotch Highlands, but now chiefly found in Scandinavia, though also in other parts of Europe, and in N. Asia. It inhabits pine districts, feeding chiefly on the shoots and leaves of the Scotch fir. Recently attempts have been made, with partial success, to reintroduce the C. into Scotland. These birds are imported from Norway and Sweden in large numbers for the London market in winter, being captured princi-



Capercailzie.

pally by means of traps. The C. is a bird of large size, measuring about 3 feet in length from the bill to the extremity of the rounded tail. The male is coloured grey, mottled with brownish-black; the females being variegated with the latter colour, with white, and with yellowish-brown. The bill is short, compressed at the tip, and of whitish colour, and a patch of naked scarlet-coloured skin exists above the eye. The tarsi are feathered, but the toes themselves are naked. These birds are polygamous, the males resorting generally year by year to the same spot, at the breeding season, to call the females. The eggs number from six to twelve, and are of pale reddish-brown colour, spotted with darker brown. The nest is built on the ground, and the female incubates for about four weeks.

Caper'naüm, the town on the N.W. shore of the Lake of Galilee which our Saviour made his headquarters during his public ministry. Two places, according to different travellers, have claims to be considered the site—ruins called Tel Hûm, about 3 miles from the point at which the Jordan enters the lake, and other ruins called Khan Minyeh, 3 miles farther along the shore.

Capers, the pickled flower-buds of *Capparis spinosa*, the caper-bush and allied species belonging to the natural order *Capparidaceæ*—*e.g.*, *C. spinosa* is used in the S. of Europe, *C. Fontanesii* in Barbary, *C. Ægyptiaca* (which is said to be the hyssop of Scripture), in Egypt, *C. aphylla* in India, &c. C. are stimulant, antiscorbutic, and aperient. The flower-buds of *Zygophyllum Fabago*, those of *Caltha palustris* (q. v.), and those of the Indian cress or canary-plant (*Tropæolum majus*) are sometimes substituted for the true caper. The term 'caper-bush' is sometimes given to the caper-sponge, *Euphorbia Lathyris*, one of the *Euphorbiaceæ*.

Cap'et,* The House of, supplied France with kings from 987, when Hugues C. ascended the throne, till the death of Charles IV. in 1328, when the House of Valois, in the person of Philippe VI., succeeded. The earliest historical figure of the family is that of Robert the Strong, Comte d'Anjou and Paris, who died in 866 at Mans, where he was resisting the Normans, against whom Karl the Bald was powerless. On the death of Karl the Fat in 888, Robert's son, Eudes (*Odo*), was elected King of Neustria, the Comte de Poitiers becoming King of Aquitaine. In 922 Robert, a brother of Eudes, and allied to the House of Burgundy, drove Karl the Simple (*le Sot*, lit. 'the fool'), into Lorraine, was himself proclaimed king, but was defeated and killed the following year. His son, Hugues the White (*le Blanc*), Comte de Paris, after a stormy and ambitious career, died titular Duc d'Aquitaine in 956. He left three sons; Eudes and Henri, who became Dukes of Burgundy, and Hugues C. (oldest form *Hûon Chapette*), or the Great, who probably held a place like that of his father till the death of Ludwig the 'Do-nothing' (*le Fainéant*) in 987, when he was elected king in opposition to Karl of Lorraine, the last of the Karolings, whom he afterwards made a prisoner at Orleans. Up to this time the kings in France are to be considered Germans, and it is right that their names should be given in a German form. With the accession of the Capetian dynasty begins the line of French kings proper. Almost nothing is known of Hugues' subsequent life, except that he supported Gerbert, the courageous asserter of Gallican Church rights. He married Adelaide of Guienne, and died 24th October 996. His son, Robert the Pious (*Debonair*) (II.), succeeded without election. There was no centralisation, the tie between the King and his subjects was feudal, and no general taxes were imposed, and no general council held. His second wife, Constance of Provence, introduced much of the polished gaiety of the S. to the French court. In spite of the mild and benevolent character of this King (who was chiefly remarkable for his knowledge of Church music), he authorised the cruel suppression of the Gnostics of Orleans (1022), and the more atrocious persecution of the Jews, who were absurdly supposed to have suggested the destruction of the Holy Sepulchre to the Calif Hakim. The town communities began in this reign to enter into formal treaties for peace and regular justice between themselves and with the *seigneurs*, and the Church attempted, by the 'Peace of God,' to modify the disastrous private wars of the feudal chivalry. After seeing all his sons in revolt against him, Robert died, 20th July 1031. He was succeeded by his son Henri I. (1031–60), whose reign is marked by a war with William of Normandy, the transubstantiation controversy of Berenger, a distressing famine, and renewed efforts of the Church in the 'Truce of God' to limit in time, and place, and ferocity the private wars which the 'Peace of God' had failed to stop. Henri was succeeded by his son, Philippe I. (1060–1108), who for some time was under the regency of the great crusader, Baldwin of Flanders. His subsequent reign was marked by the rapid growth of the institution of chivalry (tournaments, *pas d'armes*, and courts of love now appearing); the enfranchisement of towns and incorporation of trades; the long struggle of Philippe and Hildebrand (Gregory VII.); the excommunication of Philippe at the Council of Autun (16th October 1094), he having repudiated his first wife, Bertha, and contracted a canonically incestuous marriage with Bertrade of Anjou. Under Louis VI., or the Fat (1108–37), called the *Damoiseau* of France, the 'gay science' flourished, and Abelard was the most popular man of letters. His son, Louis VII., the Young (*le Jeune*), (1137–80), the leader of the Second Crusade married Eleanor of Guienne, who, on her divorce, became the wife of Henry II. of England. By the help of the Pope and of à-Becket, Louis gained several advantages over Henry, whose sons he supported in their revolt. His reign was also marked by the spread of the heresy of the Albigenses, Henricians or *Bonshommes*. His son, Philippe II., Auguste (1180–1223), succeeded to the throne. By his first marriage with Isabelle of Artois, heiress of Vermandois, he is said to have united the Houses of C. and Charlemagne. Philippe, who has been called the founder of the feudal monarchy which succeeded the feudal federalism, directed two great crusades, one to Jerusalem, the other against the Albigenses. His son, Louis VIII., the Lion (1223–26), who contested the English throne with John, perished in the second crusade against the Albigenses. The chief incidents during the minority of his famous son Louis IX., or St Louis (1226–70), were the suppression of free thought and the establishment of the Inquisition in Languedoc. Later on in his reign, Louis, by his abolition of many feudal privileges and modes of judicial procedure, by the creation of the Parliament of Paris, and by the Pragmatic Sanction, greatly strengthened the absolute power of the crown and the independence of France. A younger brother of Louis, Charles d'Anjou, obtained from Rome the investiture of the kingdom of the Two Sicilies on the death of Conradin, the last of the House of Suabia. This right, ultimately bequeathed by the Comte de Maine to Louis XI., led to the Italian wars of succession in the end of the 15th and beginning of the 16th centuries. By his wife, Marguerite of Provence, Louis had many children: among others Robert of Clermont, the founder of the later line of Bourbon, whose descendant, Antoine, married Jeanne of Navarre, and thus united, in the person of Henri of Navarre, the two lines of Capetian succession. Louis was succeeded by his eldest son, Philippe III. (*le Hardi*), the Bold (1270–85), whose intervention in Navarre and Castile against Pedro of Aragon shows the increasing importance of France. He married successively Isabel of Aragon and Marie of Brabant, and was succeeded by his eldest son, Philippe IV., the Fair (*le Bel*), 1284–1314, in whose reign Guienne was added to France, the Flemings asserted their independence at Courtrai, the rights of municipalities were made the subject of a national ordinance, the States-General met five times, and the Papal prerogatives, asserted in the Bull *Ineffabilis*, were strongly opposed. The following were the children of Philippe and Jeanne of Navarre and Champagne:—(1) Louis X., the Quarrelsome (*le Hutin*), 1314–16, who strangled his first wife, Margaret of Burgundy, to make way for his second, Clemence of Hungary, and who granted several charters of provincial liberties, some restricting the royal rights of taxation, others restoring objectionable feudal arrangements; (2) Isabel C., who married Edward II. of England, and whose son, Edward III., consequently claimed the throne of France; (3) Philippe V., the Long (*le Long*), 1316–22, who compelled the States-General to adopt the Salic law, and who lent himself, under the influence of Pope John XXII., to the most horrible persecutions of Jews, lepers, magicians, and heretics; and (4) Charles IV., the Fair (*le Bel*), 1322–28, who, like his brothers Louis and Philippe, left no sons, and whose daughter, Blanche, was therefore excluded from the throne by her father's cousin, Philippe VI., the first king of the House

* It is uncertain whether the name 'Capet' comes from 'cape' or 'cap' (the hood of St Martin) which Hugues wore instead of a crown, or from the size of his head.

of Valois, and son of Charles of Valois, younger brother of Philippe IV. and Marguerite of Anjou. The savage persecutions (such as those of the Templars, accused and convicted on evidence got entirely through torture of the most childish charges, and of the *Pastoureaux*, who attempted to organise a crusade in 1320) of which the later Capetian kings had been guilty; the anathemas of Pope Boniface VIII. following on their violation of ecclesiastical immunities; the doubtful legality of their marriages, and the undoubted infidelity of their wives; their early deaths, predeceased by sons: all these things combined to make the French people generally believe that the House of C. was accursed of God. See Kitchin's *History of France* (Clar. Press Series, 1873).

Cape Town, the capital and principal seaport of Cape Colony, lies on the S. shore of Table Bay, 32 miles N. of the Cape of Good Hope, from which it takes name. It is the great western commercial centre of S. Africa, and is the seat of the colonial government, of the supreme court, of a college and university, and of a bishop. The town occupies the slopes of the plain descending from Table Mount, and is overlooked by the Lion's Head and other eminences. The streets, which are long and wide, intersect each other at right angles, and there is all the appearance of an English commercial town in the dwelling-houses, shops, hotels, and tramways. Of the public buildings, the most notable are the Houses of Assembly and Legislature; the S. African Museum, to which is attached a large library and a valuable botanical garden; the Roman Catholic Cathedral; a castle of considerable strength, an arsenal and barracks. Besides numerous Protestant churches there are a Jewish synagogue and a Mohammedan mosque. The town is supplied with excellent water. In summer the mean temperature is 76·6° F., and in winter 58·3°. C. T. is connected by railway with Worcester, and by telegraph with various other places of importance. It communicates with England five times monthly by regular mail-service, the average passage having been reduced in 1876 to twenty-five days Its chief exports are wool, copper ore, diamonds, and wine. The harbour is now protected by a breakwater, and has a patent slip and extensive docks Municipal affairs are administered by a town-council, presided over by a mayor. The town returns two members to the Colonial Assembly. Pop. 29,000, excluding the maritime village of Simon's Town, and the delightful suburb of Rondebosch, where the merchants have their villas.

Cape Verd Islands (Port. *Ilhas do Cabo Verde*, 'Isles of the Green Cape'), an archipelago in the N. Atlantic, lat. 14° 45'–17° 19' N., long. 22° 45'–25° 25' W., belonging to the Portuguese, and named after Cape Verd, on the W. coast of Africa, 320 miles to the E. It consists of ten islands (nine of which are inhabited) and four islets, divided into a northern and southern group. To the former belong Boavista, Sal, São Nicolao, São Vincente, Santa Lucia (uninhabited), São Antonio, and the islets of Branca and Rasa; to the latter Santiago, Maio, Fogo, and Brava, with the two islets of Rombo. Area, 1630 sq. miles; pop. (1872) 76,003. The largest is Santiago, 32 miles long and 15 broad. All are mountainous and volcanic, the highest point being reached in the crater-peak of Fogo, which is 9157 feet above the sea, and is still active, the last eruption having taken place in 1847. The climate is hot and unhealthy; rains and warm mists are prevalent, sometimes lasting a whole year, spoiling the harvests, and cutting off great numbers of the inhabitants. The soil is not well suited for agriculture, and there is little or no timber in the group. Indigo, cotton, rice, maize, and millet are grown; and of late years the vine, beetroot, tobacco, coffee, oranges, and many other tropical and sub-tropical fruits have been largely cultivated. The trade in archil, or cudbear, a valuable violet dye, yields a large annual revenue. Turtles are caught on the coasts; amber is found on the shores of all the islands; salt is procured from the lagunes by solar evaporation.

Some of the islands were discovered as early as 1441 by two Genoese brothers in the service of Portugal, Antonio and Bartolomeo di Rolli, but they were first claimed by the Portuguese after Cada Mosto (q. v.) had visited them in 1456. Along with the Portuguese possessions in Senegambia they are ruled in secular matters by a governor-general, who resides in São Vincente, and are ecclesiastically under a bishop whose diocese contains about thirty churches.

Cape Weed (*Rocella tinctoria*), a lichen from the Cape Verd Islands, from which a dye is obtained.

C. W. is also a name given in New Zealand to the European cat's ear (*Hypochæris radicata*), which has been introduced into that colony, and in the vicinity of Dunedin, Otago, is taking the place of the cultivated grasses in the pastures. The name is also applied in Australia to *Cryptostemma calendulacea.*

Cap'ias, in English law, is the prenomen to several kinds of writ, issued either before or after judgment. It is no longer, however, used in beginning personal actions; a writ of summons having been substituted for C. in the superior courts at Westminster.

C. ad respondendum is a judicial writ by which all actions, not relating to land or real property, are begun against any one not in custody, whom it is intended to arrest or hold to bail.

C. ad satisfaciendum, usually called *ca sa*, is a writ of execution to imprison the defendant, when it is still lawful to do so, after judgment has been pronounced against him, until he satisfy his creditor.

C. utlagatum is a writ against a person outlawed.

Cap'illaire, a syrup prepared by adding sugar and orange-flower water to an infusion of maidenhair fern (*Adiantum Capillus Veneris*) or some allied species. It is much used in France for cough mixtures, is agreeable to the taste, but possesses no medicinal virtue.

Cap'illary Vessels. This term is applied to the minute vessels intermediate between arteries and veins. The arteries convey blood from the heart, the veins collect and bring back the blood to the heart, while the C. V. connect the terminations of the arteries with the commencements of the veins. The C. V. are minute tubes, the walls of which are formed of flattened nucleated cells placed edge to edge. In recent times these cells have been rendered visible by a method of immersing the tissue in a dilute solution of nitrate of silver and afterwards exposing it to the action of light. When this has been done successfully, the edges of the flattened cells are blackened, and their contour thus demonstrated in an exquisite manner. Without this method the walls appear to be formed of a structureless membrane in which cells are embedded. As the cells forming the walls of the C. V. are sometimes irregular in shape, it is evident that their apposition will occasionally leave small apertures. These have been termed *stomata*, and, according to some observers, they are the openings through which the colourless cells of the blood pass during the inflammatory process. (See INFLAMMATION.) The finest capillaries are sufficiently broad to allow coloured corpuscles of the blood to pass in single file. They thus vary in diameter from the $\frac{1}{3000}$ to the $\frac{1}{2000}$ of an inch—the average size in the human being is about $\frac{1}{3500}$ of an inch. C. V. are highly elastic and extensible, and where there is life, they possess also the vital property of contractility. C. V. freely unite with each other, forming a plexus. The character of the plexus varies in different organs or tissues. It may be an irregular network, as in areolar tissue, an elongated meshwork, as in muscle, in loops and tufts, as in skin; it may be a radiating arrangement, as in the liver, or in round balls or *rete*, as in the Malpighian bodies of the kidney. It is a physiological fact that in any tissue or organ in which there is great functional activity there are numerous capillaries. Two parts in close proximity to each other may differ in this respect. For example, the grey or generating matter of the brain and spinal cord is much more vascular than the white or conducting matter. For descriptions of capillary arrangements, see articles on the various tissues and organs.

Capillar'ity, the general name given to certain phenomena observable at the surface, separating two fluids (which do not mix), or a fluid and a solid. To take the commonest example, let a clean glass rod be plunged into water, and the liquid will be found to ascend all round it, forming a concave surface. Instead of the rod, substitute a tube of small bore, and not only will the same phenomenon be visible at the exterior surface of the tube, but the column of water inside will rise above its former level to a height which is found by experiment to vary inversely as the diameter of the bore; and, further, the surface of this column will assume a more or less concave form. If mercury be used instead of water, exactly the reverse will be observed—the surface becoming convex, and being depressed in the tube to an extent depending in the same way upon the diameter of the

bore. Two parallel plates immersed in either liquid produces the same effects, subject to the same laws, and the variation of level in this case is half that produced by a tube, the diameter of whose bore is equal to the distance between the plates. These interesting phenomena depend upon what is known as the *superficial energy* or *tension* of the bounding surface of the liquid. It is on account of this tension that a soap-bubble tends to contract and drive a current of air through the tube by which it is blown, and to which it is attached. It is further evident that the force or pressure due to the tension of a curved surface must act inwards, *i.e.*, from the convex to the concave side; and consequently, the ascent or depression of the liquid in the tube, according as its surface is concave or convex, is a hydrostatical necessity, since this tensive force in the one case diminishes, and in the other increases the total pressure upon the surface of the column of liquid. The curved form of the surface is easily accounted for upon the hypothesis of molecular forces, which are sensible only at insensible distances. According to this theory, a molecule of glass has a greater attraction for a molecule of water, and a less attraction for a molecule of mercury, than either of these has for another of its own kind. From this it is at once deducible by the principle of composition of forces, that in capillary phenomena water forms a concave, and mercury a convex surface. A very lucid explanation of the mathematical theory of C. is given in Professor Clerk Maxwell's *Theory of Heat*, chap. xx.

All liquids which wet glass present the same capillary phenomena as water; while liquids which do not wet glass act like mercury. Since the wetting power of a liquid depends upon its molecular constitution, it follows that C. must be dependent not only upon the kinds of matter used, but also upon the temperature at which the phenomena are observed. If two solids are floated near each other on the surface of a liquid, which either wets both or wets neither, they run together as if attracted; if, however, one only is wetted, they are apparently repelled. Numerous phenomena of daily occurrence, such as the power which a sponge possesses of absorbing and retaining a quantity of water, the drying action of blotting-paper, the saturation of wick by oil, the walking of certain species of flies and spiders on the surface of water, are easily explained as cases of C. This property of matter also plays an important part in the economy of nature, as, for instance, in the absorption of moisture from the earth and the air by the roots and green parts of a plant.

Cap'ita, Succession per, is a term of Scotch law denoting the distribution of an inheritance equally among a number, disregarding the right of representation. The contrary mode of distribution is *per stirpes*. See STIRPES, SUCCESSION BY. Were the inheritance of an uncle divided equally among several families of nephews or nieces, each *family* getting the same share for subdivision in itself, this would be succession *per stirpes*; but if each nephew or niece got the same share, the number of the family being unequal, this would be C. S. P.

Cap'ital (Lat. *caput*, 'a head'), in architecture, is the head or top of a column; in fortification, an imaginary line dividing a defence work into two similar parts—most frequently the line which bisects the salient angle of a Ravelin (q.v.); in geography, that city of any country where the supreme magistrate resides, or the national legislature assembles, or the government is carried on.

Capital is a general name given to all the accumulated products of past labours which are devoted to reproductive investment. It includes whatever is necessary to shelter, feed, and clothe labour, and to keep labour going. Therefore mills, machinery (fixed or movable), railway plant and permanent way, raw material of all kinds, whatever is paid out in wages to labourers to be by them exchanged for commodities, are all included in C. All depends on the intention of the capitalist to devote what he possesses to reproduction. Thus, goods in stock may properly be called C. to whatever extent the proceeds of their sale will be applied in payment of wages and charges, the execution of necessary repairs, or the provision of new instruments and materials of industry. Undoubtedly there is always existing only a certain amount of C. in England, or Europe, or the world, which the intention of the capitalist cannot increase; but in each place, and in each trade, he may either employ the *maximum* existing C., so far as it belongs to him, or a much smaller quantity, reserving the difference for his personal consumption, or for charity, or for some purpose which is not reproductive. He may even be willing to use the *maximum* for reproduction, but cannot find an investment; or the C. cannot be realised, or he must deduct from the *maximum* some preliminary outlay which is not necessary but artificial (*e.g.*, a heavy tax on the rasher stages of manufacture), or some outlay which is necessary from the state of the market but not for production (viz., the wages, so far as they exceed the wages at which it would be physically possible for the labourers to work). Of course the C. may be not owned, but borrowed by the person who employs it.

For the purposes of political economy, which is a science based on definitions assumed for convenience' sake to represent facts, C. is limited to material objects and to those which are directly consumed in the reproduction of material objects. From the social point of view, the money sunk in a prison or a church, on the one hand, in the pay of an army of national defence or in the education of a productive labourer, on the other, is rightly regarded as C.; for production goes on only under the sanctions of municipal and international peace and all the human faculties conspire in enabling the productive labourer to give his life *maximum* of labour. From the above description some obvious consequences follow—1. Money is not C., nor is credit C., however much it may facilitate the employment of C. 2. Industry is limited by C. The converse proposition lay at the root of Protectionism, it being thought that government could create additional employment without providing additional C. 3. There may not be sufficient labour to use the C., as occurs in the colonies sometimes; for this or some other reason the C. may perish unused. 4. But there can never be too much C., or savings, if there be labour in existence; for either wages are increased, or more men are employed. 5. C. is the result of saving (so far as it is not supplied in definite quantities by nature), and therefore increases with the excess of production over consumption. 6. Though saved, in the sense of being directed to reproduction, C. is always being consumed. 7. A demand for commodities merely fixes in what way C. will be used; it does not support labour. Raw materials, wages, &c., have been called circulating C., as requiring to be renewed after every production. Houses, machinery, which last for some time, but are in the end consumed, are called fixed C. The expenditure in obtaining fixed C. would enter the C. side of an account with the exception of percentage, which might be thought chargeable against revenue; but circulating C. is replaced either every year, or every period of production. Fixed C. should therefore contribute to the total production as much as will cover the cost of repairs and the annual depreciation, and leave a slight margin of profit. The conversion of circulating into fixed C. (*e.g.*, the introduction of machinery which supersedes manual industry) necessarily injures the labourers, to whom, had the machinery not been introduced, its cost would have been paid in wages. If further changes take place, diminished cost of production leading to increased production, more circulating C. will probably be saved than was converted. Most commonly, however, this saving of new C. is contemporaneous with the gradual conversion, and hence the protest of the labourers against machinery is unjust. Wholesome climate, wholesome occupation, social tranquillity, and personal health are important conditions of the saving of C., while improvidence (a vice characteristic of the savage) and want of interest in other human beings (a trait of periods of social corruption) oppose its increase. The early supremacy of Great Britain in manufactures is owing, in some measure, to her long exemption from internal wars and from the arbitrary spoliation of property.

Capital Account. In all account-keeping it is highly important to go on correct principles in distinguishing between what, in the science of accounting, is called the C. A. and the Revenue Account. Even in household economy, if a man wishes to know accurately—as every sensible man does, whether his income be small or great—his annual expenditure, he must give regard to the question which will frequently arise of whether an item of expenditure is to be regarded as payable out of capital or out of revenue. You buy a house, plainly you are not to put down the price of it as part of your domestic expenditure for the year in which it is bought. The price is an investment of capital, and to be charged against your C. A. Your income account, again, should be charged with a certain interest, say 5 per cent., on the price of the house, with a percentage to meet

repairs, or with the actual sum paid each year for repairs. So, if you buy a carriage and horses, you may put the price, in the first place, to the debit of C. A., but each year's income must be charged with 5 per cent. on the price, and with a percentage to replace *tear and wear*. In great things the principle is the same as in small. The railway company having raised its capital by the sale of shares or by borrowing (see DEBENTURE, RAILWAY), enters the amount so raised on one side of its C. A. On the other it places the expense of making the line, of buying locomotives, carriages, and of all that is required in working. The expense of maintaining all this and of working are placed to the debit of the revenue account. It not unfrequently happens in the accounting of railways, and of other public companies, that items are placed to the debit of C. A. which ought to have been charged against revenue. The dividends of one year are thus increased at the expense of those of future years; but the value of the company's share being in the meanwhile in proportion to the rate of dividend, the shareholder of the day may sell at the expense of the future shareholder. In private affairs the safe rule is, when in doubt between C. A. and revenue account, to place the item to the debit of revenue.

Capital Felonies. See CAPITAL PUNISHMENT, FELON, and FELONY.

Capital Punishment is in criminal law the punishment of death. Three grounds of objection have been taken to this punishment: that its deterrent effect is not so strong as that of some other modes of punishment; that it is a punishment which men have not a right to inflict; that it is contrary to Scripture.

To decide the question, according to reason, there can be no doubt that there are many punishments more severe. To be kept alive in continual torture will probably be allowed by most people to be worse than death, which must sooner or later come to all, and which all true Christians hope and believe will lead them to a life better than that from which they have been taken. Nevertheless, the force or instinct which impels us to cling to life is the master-force of all animal being. It may be overcome, as we see that it often is, by some temporarily strong force; still, over the mass of mankind, this instinct is supreme. We use the word *instinct* for want of a better. We denote by it that inscrutable inward force which impels a man to act independently of his reason, and often directly against it.

The second objection to C. P. may be based on the ground—the firmest, we think, that it can be based on—that the abandoned criminal, the murderer, let us suppose, is really, as a general rule, *visibly* the product of circumstances, and of the errors and sins of the society which produced him. Born probably in a degraded quarter of one of our great cities, with a debased brain, in some dark dwelling of squalor, drunkenness, and blasphemy, is not his crime the crime of society rather than that of the individual—of a society which, living in luxury, yet fosters this criminal hotbed in the midst of it? And if the crime be chargeable against society, what *right* has society to let the whole weight of punishment fall on the individual? Plainly it would be impossible in a short article to discuss this social problem, but obviously, whatever be the *right* of society, its *might*—by some held to be the basis of right—will always be exerted on the side of self-protection. Still, it is satisfactory to find that the enlightened humanity of our times has, consistently with this law, practically restricted C. P. to the crime of murder. Formerly, in England death was the ordinary punishment of all felons *who could not read*, that is, who could not avail themselves of Benefit of Clergy (q. v.). That the punishment of death is contrary to Scripture, is a doctrine held by comparatively few. Isolated passages may be produced that apparently favour the view, and it may even seem to be in harmony with the all-forgiving spirit inculcated by the New Testament; but it is not to be held that this spirit—so beautifying, so essential, to the individual—should be so applied as to make the power of the State unable to protect the virtuous part of the community against the criminal.

Among the earliest reformers of our criminal law were Sir Samuel Romilly, M. A. Taylor, and Sir James Mackintosh; by their exertions C. P. was greatly restricted. It was, however, to Lord Brougham that we are mainly indebted for having brought the criminal law of the country into harmony with the advanced morality and intelligence of the day. By statutes passed early in the present reign, crimes punishable with death were reduced to nine, the chief of which are treason, murder, piracy, and intent to cause shipwreck. Practically, as stated, C. P. is never now inflicted in the United Kingdom except when the intention of the criminal has been to murder, or when he has caused death in the perpetration of a crime of violence.

Capital Punishment in the Army.—The Crown, with regard to military offences, has considerable legislative power, for the sovereign by the Annual Mutiny Act may form articles of war and constitute courts-martial, with power to try on account of crime and to inflict penalty; the penalties, however, must not extend to 'life or limb,' except for crimes expressly declared to be so punishable by the Act. The Mutiny Act comprises a series of regulations which are annually enacted by Parliament for the government of the military forces of the United Kingdom. It provides that every officer or private who shall excite or join any mutiny, or, knowing of it, shall not give notice to the commanding officer, or shall desert or enlist in any other regiment, or sleep at his post, or leave it before he is relieved, or hold correspondence with a rebel or an enemy, or strike or use violence to his superior officer, or disobey his lawful commands, shall suffer death, or 'such other punishment as the court-martial may inflict.'

A court-martial may sentence to death, penal servitude, or imprisonment, with or without hard labour, according to the nature of the offence. Judgment of death by court-martial requires the concurrence of two-thirds of the officers present. Employment of a soldier after arrest on a capital charge has been held to bar the carrying out of punishment. It was held to do so on one occasion by the Duke of Wellington, in Spain; but this view does not seem in harmony with the ever-memorable case of Sir Walter Raleigh. The incidents are too well known to require repetition; but it may not be generally known that the law, as laid down on the ocasion by Lord Chief-Justice Montague, has been approved of by Lord Chancellor Campbell. It is that Sir Walter having been condemned for treason, a commission from the king, under the Great Seal, could not operate as a pardon, and that attainder could only be done away with by letters-patent, under the Great Seal, reciting the crime and granting pardon.

Capital Punishment in the Royal Navy.—The government and discipline of the navy is directed by rules and articles enacted by the authority of Parliament. Under these the following offences are punishable with death: Misconduct in flag or commanding officer upon signal of battle, if acting traitorously; cowardice or treachery in action by any one; mutiny, if accompanied by violence. Spies are punishable with death. See ARTICLES OF WAR, MUTINY ACT.

Capitals, large letters (Lat. *majuscula*), as distinguished from small letters (Lat. *minuscula*), used in writing and printing for certain purposes of convenience, clearness, effect, &c. Printers formerly employed them much more liberally than they do now. In English books all nouns-substantive at one time began with C., a practice now discontinued except in the case of proper names, but still universal in German books. Adjectives formed from proper names begin in English books with C., but not in French and German books. The initial letter of a word may be a capital, and an entire word may be printed in C., but they must not be introduced indiscriminately into the body of a word. In the MSS. of the middle ages initial C. are often beautifully illuminated.

Capitana'ta, a province of S. Italy (Apulia), occupies the 'spur of Italy,' on the Adriatic coast, and has an area of 2943 sq. miles, and a pop. (1871) of 319,164. It is a rich pastoral and grain-growing district, watered chiefly by the Carvajo, Carapelta, Candelaro, and Sasola. Four railways intersect it, converging in the capital, Foggio.

Capita'tion means a numbering of persons. The word is generally applied to denote a tax payable per head (Lat. *caput*), *i.e.*, by all, without regard to property or other circumstance.

Cap'itol (Lat. *Capitolium*), the citadel of ancient Rome, on the summit of the Capitoline Hill. The hill was originally called *Saturnius*, then *Tarpeius*, from the fate of the virgin *Tarpeia*, and finally *Capitolinus*, from the discovery (according to the Roman legend given by Varro, Livy, and others) of a human head (*caput*) by the workmen when digging the foundations of the Temple of Jupiter. The work was begun in the

reign of Tarquinius Priscus. The walls were built by Servius Tullius; the building was finished by Tarquinius Superbus, and consecrated by the Consul M. Horatius, 507 B.C. It was burnt in the civil war of Marius, 83 B.C.; restored by Sulla, destroyed under Vitellius, rebuilt by Vespasian, destroyed by fire at his death, and finally rebuilt by Domitian, who expended an enormous sum of money on the gilding and decoration of it. It was a structure of great beauty and magnificence, with an ascent of 100 steps; its gates were of bronze; it was adorned with paintings, statues, chariots, silver shields, and costly vessels, and contained three shrines, dedicated respectively to Jupiter, Juno, and Minerva. Besides the C., there were other famous buildings on the mount, *e.g.*, the Temple of Jupiter Tonans, erected by Augustus; the *Tabularium*, or Record Office, &c. The modern structure, on the site of the ancient C., was designed by Michael Angelo.

Capit'ularies (Lat. *capitularia*, 'little headings') is the name given to the decrees issued in Latin by the Frankish kings after consultation with their assemblies. 'They are of the most varied description; not codes of law at all, but decrees, advices, opinions upon particular questions as they arose' (Kitchin, *Hist. of France*, p. 137). All the C. are not extant, and many survive only in outline. By far the richest and most complete are those of Charlemagne and his son, Ludwig the Pious. The former have been classified and described by Guizot in his *Civilisation en France*. For the real history of the time they are the best source of information we possess, giving a clear insight into the political and moral administration in all its details of that vast empire which the genius of the great German held together. The most complete collections are the *Capitularia Regum Francorum*, with notes by Baluze (2 vols. fol. Par. 1677), and that of Pertz in the *Monumenta Germaniæ Historica* (Hann. 1835-37).

Capitula'tion is a military term denoting both the act of surrender to an enemy, and the formal treaty according to which surrender takes place. From the articles or headings (Lat. *capitula*) essential to the latter the name C. has originated.

Cap'iz, a town on the N. coast of the island of Panay, one of the Philippine group. It is defended by a small fort, and has a pop. of about 11,000. C. is the residence of a Spanish alcalde, and gives name to a province, which had a population in 1871 of 272,292.

Cap'nomancy (Gr. *kapnos*, smoke, and *manteia*, divination), an ancient mode of divination from observing the ascent and motion of smoke arising from the sacrifices on the altar. Another mode was to throw jasmine or poppy seeds on the fire, and to observe the figures formed by the smoke.

Ca'po d'Is'tria, a town of the Austro-Hungarian empire, coastland of Istria, 8 miles S.S.W. of Trieste, on a rocky island in the *Valle Stagnone*, but connected with the mainland by a stone bridge. Its health is greatly affected by malaria. C. has a beautiful cathedral and numerous churches. There is a good coasting trade, some shipbuilding and fishing; and the manufacture of salt is carried on to the extent of 20,000 tons yearly. Pop. (1869) 7539. C. was anciently known as *Ægida*; after its conquest in the 6th c. by Justinian it was called *Justinopolis*, in honour of the emperor's uncle. In the 10th c. it passed under Venetian rule, and at the close of last century became Austrian.

Capo d'Istria, or **Capo d'Istrias, Joannes Antonios, Count**, was born at Corfu in 1776. The family to which he belonged was originally from the town of Capo d'Istria (q. v.), and had been raised to the rank of Count by the Dukes of Savoy. In 1807, after the treaty of Tilsit, C. entered the Russian service as a diplomatist; shortly after 1815 he was appointed one of the secretaries of state for foreign affairs, and took a leading part in the negotiations concerning Greece, of which he was elected president in 1827, and installed early in the following year. But his administration was highly unpopular. He restricted the liberty of the press, and was suspected of wishing to become perpetual president, with despotic powers, and to make Greece subservient to Russia. The result was his assassination at Nauplia, October 9, 1831. See *Mémoires biographiques, historiques sur le Président de la Grèce, accompagnés de Pièces justificatives et authentiques*, by Papadopoulos Vretos (2 vols. Par. 1837-38).

Caponière' (Fr. *capon*, 'a cheat or pretender'), in fortification, is a parapet, usually 8 or 10 feet high, placed in a ditch for its defence by firearms, the defenders being covered on the sides, when the C. is called single, and sometimes overhead, when it is called double. Generally the C. is of earth; sometimes it is of brickwork, loopholed at the sides; while in field-works there are occasionally thrown across the ditches of redoubts palisade caponières.

Cappado'cia, in ancient times a province of Asia Minor, W. of the Euphrates and N. of Cilicia, and corresponding partly with the modern Karaman (q. v.). Its dimensions varied greatly at different times, and the divisions of Pliny do not agree with those of Strabo. Under the Persians it was divided into two satrapies. The Macedonians raised these into kingdoms. In 17 A.D. C. became a Roman province, governed by a procurator. It produced wheat in abundance, and was famous for its breed of horses.

Capp'agh Brown, or **Manganese Brown**, is a bituminous earth coloured by oxide of manganese and iron, employed as a source of brown pigments used in the arts.

Capparida'ceæ, or **Capparid'eæ**, a natural order of Dicotyledonous plants, mostly natives of tropical or sub-tropical regions. The common Caper (q. v.) is the only European species, and also the one which is found farthest N. There are in all about 355 species and 33 genera.

Their properties are like those of the *Cruciferæ*—viz., pungent, stimulant, and antiscorbutic. Some are poisonous. In addition to the capers, *Cleome* is a genus of C. which contains some very pungent species, used as condiments. *Cratæva religiosa* is used by the natives of India as a stomachic and tonic. *Gynandropsis pentaphylla*, also a native of India, is antispasmodic. The seeds are used as a substitute for mustard, and the leaves are employed as rubefacients, and even as blistering agents. *Polanisia* is used as mustard, the root of *P. icosandra* internally as vermifuge, externally as a rubefacient, &c. (Bentley.) The berries of *Capparis sodata*, of Central Africa, are, when dried, used as a condiment in the food of the natives. Salt is obtained from the ashes of its roots.

Capp'el, a village in the canton of Zurich, Switzerland, 4 miles N. of Lake Zug, where the reformer Ulrich Zwingli fell in an action with the Roman Catholics in October 1531. Pop. (1872) 732.

Capro'ra, next to Maddalena the largest island of the group called the Buccinari, lies about a mile off the N.E. coast of Sardinia, within the Strait of Bonifacio, and is chiefly notable as the residence of Garibaldi, who acquired property here in 1854. It is rocky, has no streams, affords not even pasture, and is only inhabited by a few fishermen. C. belongs, with the rest of the group, to the Italian province of Sassari, and is named from its wild goats (Lat. and Ital. *capra*, a she-goat).

Cap'ri, an island in the Mediterranean, at the mouth of the Bay of Naples, 11 miles in circumference. It is the ancient Capreæ, a favourite residence of Augustus, and where his successor Tiberius spent the last ten years of his life in the unrestrained indulgence of the foulest debaucheries. The remains of baths, aqueducts, and of the twelve villas erected by Tiberius are still visible. The island is composed almost entirely of limestone, and the E. and W. portions consist each of an abrupt hill, the western being considerably the more elevated, with a saddle-shaped depression between, where the town of C. stands. On either side of this are two coves, forming the only landing-places on the island. The total population is about 6000, consisting chiefly of fishers, vine-dressers, and cultivators of the olive. The greatest natural curiosity is the large elliptical *Grotto Azzura* (Blue Grotto), a cavern opening from the sea, by an entrance only 3 feet high, the interior of which exhibits an unsurpassable splendour of colour arising from the action of the sun's rays on the half-hidden water.

Cap'ric or **Rutic Acid** is a solid crystalline substance at ordinary temperatures, having a faint smell of the goat. It was discovered by Chevreul in cow's butter, in which it exists combined with glycerine (see GLYCERIDES). It also occurs in cocoa-nut butter, and in the Fusel Oil (q. v.) from whisky-distilleries. C. is a fatty substance analogous in constitution and properties to acetic acid, and belongs, like the latter, to the group of bodies called *Fatty Acids* (q. v.). Its chemical composition is expressed by the formula $C_{10}H_{19}O(OH)$.

Capriccio (Ital. 'whim'), in *painting*, is a term applied to such designed violations of ordinary rules as foliated ornaments with Cupids, or other figures, in situations not strictly natural. In *music*, C. is a free composition, not subject to rule in form or figure. Mendelssohn's B-minor C. for pianoforte and orchestra is the most celebrated of modern times.

Capricor'nus, the *Goat*, a constellation of the southern hemisphere, and the tenth sign of the zodiac (symbol, ♑), marking the winter solstice (see TROPICS). Its position may be found by producing the line joining the Pole-star and Deneb to about four times its length; but the whole constellation is inconspicuous, the two brightest stars (in the horns) being only of the third magnitude.

Cap'ridæ, the sub-family of Ruminants included generally in the family *Ovidæ* (sheep and goats), and which more especially includes the goats as distinguished from the sheep. In turn the *Ovidæ* form a group of the *Cavicornia* or division of 'hollow-horned' ruminants. In the goats (*Capra*) both sexes have horns, and no *lachrymal sinuses* or 'eye-sacs' exist. The throat is provided with long hair forming a beard, which may be present in both sexes or in the males only. See GOAT.

Caprifica'tion, a method at one time extensively adopted to secure or hasten the maturation of figs, but now almost discontinued as unnecessary. The method adopted was suspending a fruit-bearing branch of the wild fig over those of the cultivated tree. The fig, having both male and female flowers inside its receptacle, the *rationale* is believed to have been that an insect which hastens the process by distributing the pollen, entered from the fruit of the wild fig into the receptacle of the cultivated one. The term is also adopted to express any fertilisation of flowers by the aid of insects.

Caprifolia'ceæ, or **Lonicera'ceæ**, the Honeysuckle order, a natural order of Dicotyledonous plants, chiefly natives of the northern parts of Europe, Asia, and America; very few are found in the southern hemisphere. *Viburnum* (Guelder rose), *Sambucus* (elder), snowberry (*Symphoricarpus racemosus*), honeysuckle (*Lonicera*), and *Linnæa borealis* belong to the order. In all there are about 230 species, and 16 genera. Emetic and purgative properties belong to some of them; others are astringent, sudorific, or diuretic, and some are acrid. The roasted seeds of *Triosteum perfoliatum* are mild, purgative, and emetic, and the seeds have been used as a substitute for coffee. See VIBURNUM, GUELDER ROSE.

Caprimul'gidæ, a family of Insessorial birds, included in the sub-order *Dentirostres*, and including those forms familiarly known as 'goat-suckers,' and which are nearly allied to the swallows (*Hirundinidæ*). The bill is short, depressed, and the gape is wide, and provided with bristles adapted for the capture of the insect prey which these birds pursue on the wing. The wings are long and pointed. The plumage is soft, and the eyes large, these birds being nocturnal in habits.

Caproi'c Acid is an oily liquid occurring in the state of combination in cow's butter, cocoa-nut oil, and in *Satyrum Hircinum*, and some other plants; also in human perspiration, in Limburg cheese, and in the water of the Hahnbach, a small river of Hanover. It has been prepared artificially. C. has a peculiar odour resembling perspiration: it is insoluble in water, has an acrid, burning taste, and forms crystalline salts with the metals. C. belongs to the group of *Fatty Acids* (q. v.), and has the composition represented by the formula $C_6H_{11}O(OH)$.

Capryl'ic Acid is an oily liquid having physical properties similar to those of Caproic Acid (q. v.), like which, it is found in cow's butter, cocoa-nut oil, and in some kinds of Fusel Oil (q. v.). It is said also to be found in certain plants, has been prepared artificially, is insoluble in water, and forms crystalline salts with metals. It belongs to the group of *Fatty Acids* (q. v.), and has the composition represented by the formula $C_8H_{15}O(OH)$.

Capsell'a, a genus of plants of the natural order *Cruciferæ*. *C. Bursa-pastoris*, the shepherd's purse, is very extensively distributed over the temperate regions of the world. It grows in all soils, but to the greatest luxuriance in the richest, hence it is often called the 'pickpocket.' It was formerly used as a pot-herb, as it is still in some parts of America. C. is an annual, and consists of six known species.

Cap'sicine is an Alkaloid (q. v.) contained in Spanish pepper (*Capsicum annuum*). The same name is applied in America to an oleo-resinous substance obtained from cayenne pepper (*Capsicum baccatum*).

Cap'sic[illegible] belonging to the natural order *Solanac*[illegible] the E. and W. Indies and other hot climate[illegible] chiefly shrubby plants, and are extensively cultivated for the beauty of their fruit, which is a kind of membranous pod of a beautiful scarlet, yellow, or greenish colour. It is possessed of acrid and stimulating properties, is extensively used as a condiment under the name of Cayenne Pepper (q. v.), and also for pickling. There are various species in use. *C. annuum*, the most common, is a herbaceous annual, and many of the so-called species are most likely only varieties of *C. annuum*. *C. fastigiatum*, a small shrub, 1 to 2 feet high, with an orange-red fruit fully half an inch long, furnishes the C. of medicine. The dried ripe fruit has an intensely hot taste, and is used in doses of ½ to 1 grain as a condiment in much the same way as pepper. It is also extensively employed as a gargle in relaxed sore throats. *C. frutescens*, along with *C. fastigiatum*, yields the bird pepper of the shops. The fruit of various species is sold by druggists as chillies, a Mexican name for C. In medicine, it may be given in powder or in pill, but is generally used as a *tincture*, a preparation of C. in spirits. When preserved in acetic acid, it is the substance known as chilli vinegar. C. owes its properties to Capsicine (q. v), a thick yellowish-brown liquid.


Capsicum longum.

Cap'stan, a machine used principally on shipboard for heaving the anchor. In its older and common form the chain or cable is coiled round a vertical barrel, above which is a 'head' containing the sockets for a number of long wooden bars. The C. is worked by the sailors by means of these bars. Many other varieties of C. are now used, and in large vessels they are generally worked by a small steam-engine.

Capsule, a small vessel, from the Lat. *capsula*, diminutive of *capsa*, 'a box or chest.' In physiology it is a small membraneous sac, investing an organ; and in botany a dry syncarpous, dehiscent Fruit (q. v.), opening in a variety of ways—by lids, valves, or pores. The C. opening by a lid is called *Pyxidium*, as in pimpernel and several species of *Lecythidaceæ*.

Captain, Military. In the British army, each company of infantry and each troop of cavalry has one C. His duty is to receive orders from the major in matters relating to discipline, settlement of accounts, &c., and to have these orders carried out amongst the men. Lieutenants, before they are eligible for promotion to the rank of C., are required to pass such professional examination as shall be prescribed from time to time; and if they fail to do so within five years from the date of their commissions as lieutenants, they will be removed from the service. Lieutenants of engineers who completed five years' service previous to 30th October 1871, may be promoted without examination, if specially approved of by the commander-in-chief.

Captain, Naval, is the general designation for the commander of a ship, whether belonging to the royal navy or to the merchant service. In the former the title is *post-C.*, and commanders in the royal navy are also usually addressed *C.* A C. in command of more ships than one is called a *Commodore* (q. v.). The full pay of a C. of the first class is £1, 13s. per day, of the second class it is £1, 7s. 6d. a day, and of the third class it is £1, 2s. 6d.; the half-pay rates are respectively 14s. 6d., 12s. 6d.,

and 10s. 6d. The C. is responsible for the discipline, equipment, and navigation of his ship. He ranks with a lieutenant-colonel in the army. The C. of the fleet is a temporary officer, whose duty it is to promulgate the admiral's orders, and to receive reports and returns. The post is equivalent to that of chief of the staff in the army.

Cap'tion, in Scotch law, [illegible] ehension of a debtor or 'obligant' (English [illegible] count of the non-payment of a debt or the non-perfo[illegible] a obligation. Though the C. may still be used, it has been virtually suspended by the forms contained in the Personal Diligence Act.

C. Process is a summary warrant of imprisonment, granted on the application of the clerk of court, for the purpose of compelling some one to return a paper in a process when he is unduly and contumaciously retaining it.

Cap'tive. All actions against a prisoner of war taken by the enemy stop till his return; but execution may, under certain circumstances, proceed against his estate. A C. is entitled to pay or wages during his captivity. The owners of a ship are bound in every case to procure the immediate release of a hostage, and to indemnify him for his losses.

Cap'ture, in war. The jurisdiction in all matters relative to prize and C. in war is now exclusively vested in the High Court of Admiralty. See ADMIRALTY, COURT OF. The principles of the law of C. have been authoritatively declared to be—that powers at war have a right to make prizes of the ships, goods, and effects of each other upon the high seas; that the goods of an enemy on board the ship of a friend may be taken; that the goods of a friend on board the ship of an enemy are to be restored; and that contraband goods (see CONTRABAND OF WAR) going to the enemy, though the property of a friend, may be taken.

After the treaty of peace between England and Russia was signed in 1856, plenipotentiaries of leading European powers met at Paris, when the following international laws were agreed to—that privateering be abolished; that a neutral flag covers an enemy's goods, unless they are contraband of war; that neutral goods, unless contraband of war, are not liable to capture under an enemy's flag; that a Blockade (q. v.), to be binding, must be effectual—that is, that it must be maintained by a force sufficient effectually to prevent access to the coast of an enemy. See BOOTY, PRIZE IN WAR.

Cap'ua, a fortified city in the province of Caserta, S. Italy, on the left bank of the Volturno, 19 miles N. of Naples, and connected with it by railway. As a defence to Naples on the N. its fortifications, first erected in 1231, were reconstructed and strengthened in the 18th c. on the principles of Vauban; but they proved no effective obstacle to the French in their invasion of Italy. The Gothic cathedral, with some granite columns from ancient *Casilinum*, memorable for the noble stand it made against Hannibal; the Church of the Annunziata, with many old bas-reliefs in its wall; and the arch of the Piazza dei Giudici, are the most noteworthy structures. The *Torre Mignana* within, and the *Cappella de' Monti* without the town, are memorials of a horrible butchery perpetrated here in 1501 by Cæsar Borgia. The present town dates from the year 856 A.D., and is built on the site of the ancient *Casilinum*, which had fallen into ruins as early as the second Punic war. It has had a chequered history, like most Italian towns, but in recent times is most memorable for its capitulation to Garibaldi (3d November 1860), which ended his brilliant campaign for the liberation of Southern Italy.

Ancient C., one of the largest, richest, and finest cities in Italy, lay a little more than 2 miles S.E. of the present town, just where the present *Santa-Maria di C.* stands. It was originally called Volturnum, is said to have been built by the Etruscans, and had become the capital of Campania about 417 B.C. At an early period it attained surprising wealth and prosperity, which generated in the citizens luxurious and effeminate habits, unfitting them to cope in war with their more hardy neighbours. The soldiers of Hannibal wintered in C. after the victory of Cannæ (216 B.C.), and suffered much in the matter of discipline by the luxuries and temptations to which they were there exposed. C. became a Roman colony in 59 B.C. In the 5th c. A.D. it was plundered and ruined by the Vandals. Narses rebuilt it in the 6th c.; but it sunk again under the Lombards, and in 851 was completely destroyed by the Arabs. The existing ruins are of little interest, with the exception of those of the amphitheatre, which must have been, when perfect, a magnificent structure.

Cap'uchin Monkey, the name given to various species of *Platyrhine* or S. American monkeys, belonging to the genus *Cebus*. The best-known species are the capuchin (*Cebus Apella*); the horned capuchin or sapajou (*C. fatuellus*), and the Sai (*C. capucinus*). This last is sometimes known as the weeper monkey. The tail is not markedly prehensile in these monkeys.

Cap'uchins (Fr. *capuchon*, Ital. *capuccio*, a 'hood or cowl,' from Lat. *caput*, 'the head'), a sub-order of Franciscan monks, named from their head-dress.

Cap'udan-Pasha, the Turkish High Admiral, who manages all naval affairs. He exercises also civil control over the port of Pera, the Turkish islands of the Archipelago, and several seaports and maritime districts besides.

Capyb'ara (*Hydrochœrus Capybara*), a genus of rodent mammalia, included in the family *Caviidæ* (guinea pigs, &c.), and noted as representing the largest number of the order Rodentia. The C. inhabits S. America, and in general conformation is somewhat pig-like, the familiar name of 'water-hog' being applied to it. It attains a length of 3 or 4 feet; the muzzle is heavy and blunted, the tail is abortive, and the toes are imperfectly webbed. The hair is long, coarse, and bristly, the nails are hoof-like, and the colour is undefined, the hairs being marked each with black and yellow, and the entire fur presenting a dingy-grey colour with a yellowish tint. The incisor teeth are very large, and the molars present a folded pattern. The C. is clumsy in gait and harmless in its nature. It inhabits streams, swims and dives with facility, is gregarious in its habits, and feeds on vegetable matters. The flesh is palatable, but has a musky odour.

Carab'idæ, a family of *Coleoptera* or beetles belonging to the section *Pentamera*, or those in which the tarsi are five-jointed, whilst the maxillæ possess two palpi. They are sometimes known as 'ground beetles,' and form the typical genus *Carabus*. The C. are carnivorous in habits, prowling about on the ground, and feeding on insects, worms, and like prey. Several common British species belong to this genus and family, the Bombardier Beetles (q. v.) being nearly allied forms. The colours may be brilliant, and may exhibit metallic lustres.

Car'abou. See REINDEER.

Car'acal (*Felis Caracal*), a *Carnivorous* mammal inhabiting S. Asia and Africa, and included in the Cat family (*Felidæ*). It is sometimes also scientifically designated as *C. melanotis*, a new and separate genus being thus constructed for its reception. The name C. signifies 'black-eared' in Turkish. This animal is nearly allied to the Lynxes (q. v.). Its colour is pale brown, tinged with red. The under parts are paler than the upper, and are spotted black or reddish chestnut. The lower lip, tip of the upper lip, and chin are white. The tail is short. As in the lynxes, the ears are erect and tufted. The average size is that of a large bull-terrier dog.

Caracall'a, a Roman emperor, son of Septimius Severus, born at Lyons, 188 A.D. His real name was Marcus Aurelius Antoninus Bassianus; but from a hooded Gallic tunic which he wore, he was nicknamed C. He succeeded his father in 211 A.D., with his brother Geta, whom he soon caused to be murdered, as co-regent. His brief reign was characterised by numberless acts of cruelty, licentiousness, tyranny, and crime. The baths which bear his name, the ruins of which still attest their ancient splendour, were erected during his reign. C. was assassinated between Edessa and Carrhæ, on his way to the latter, by the veteran Martialis, at the instance of Macrinus, præfect of the Prætorian Guards, 8th April, 217 A.D.

Caraca'ra Eagle (*Polyborus*), a genus of *Raptorial* birds indigenous to America, forming the type of the sub-family *Polyborinæ*. The bill in this genus is elongated, the tip slightly hooked; the wings long, with the third, fourth, and fifth quills the longest; the tarsi are scaly, whilst the throat, neck, and under part of the head are naked, or merely covered with a woolly down. Those birds are intermediate between the buzzards

and vultures. *P. Braziliensis*, or the 'Carrancha,' as it is termed in La Plata, is the most familiar form. This species occurs in all parts of S. America.

Carac'as, the capital of the S. American republic, Venezuela, and of a province of the same name, lies at the base of the *Silla de C.*, 16 miles S. of the Caribbean Sea. It was founded in 1567, is the see of an archbishop, and has a new congress hall and a university (since 1778), for which a new building was being erected in 1873. Its port is Guaira, to which a railway has been projected (1873), and it does an active export trade, chiefly in cocoa, tobacco, indigo, coffee, and dye-woods. A regular line of steamers runs monthly to New York, calling at several W. Indian ports. There are extensive exports from Europe of hardwares and textiles. Pop. (1873) 49,256, of whom some one-third are white. C. has a mild climate, but is liable to earthquakes. Some 12,000 persons were killed here by an earthquake, March 26, 1812. The *province* of C., containing much fertile land under coffee, cocoa, and cotton crops, has an area of 4800 sq. miles, and a pop. of about 260,000.

Caracci, or **Carracci**, the family name of three of the greatest of the Italian painters, the founders of the school of Bologna, the place of their birth.—**Lodovico C.**, the son of a butcher, was born in 1555. He showed so little promise as an art student, that his Bolognese instructor, Fontana, and afterwards Tintoretto, the great Venetian, advised him to abandon painting. This advice had the usual effect, and Lodovico studied with all the more assiduity the works of Titian, Paul Veronese, and the great Florentines. Returning to Bologna, he established a school of art, denounced mannerism, and urged the necessity of combining the study of nature with that of the great masters. He made pupils, and afterwards allies, of his cousins, and the fame of his school was soon unrivalled. His chief works are 'St Francis,' the 'Transfiguration,' 'Birth of St John the Baptist,' and the 'Translation of the Virgin. Lodovico died in 1619.—**Agostino C.**, cousin of Lodovico, painter, engraver, and *littérateur*, was born in 1558, and died in 1602. His great picture is the 'Communion of St Jerome' in the Louvre; but he is best known for his engravings, which are models of drawing.—**Annibale C.**, brother of Agostino, and the most celebrated of the family, was born in 1560. It was intended that he should follow his father's business—that of a tailor; but having gone to study art under his cousin Lodovico, he showed unmistakable genius for painting. He improved himself by travel and by the study of Correggio, Tintoretto, Paul Veronese, and the splendid colourists of that school. Invited to Rome by Cardinal Odoardo to embellish the Farnese Gallery with painting, he spent eight years in this work, receiving as his reward only 500 crowns. C. died at Rome in 1609, and was buried at his own request by the side of Raphael. C.'s chief pictures are a 'Nativity' (in Paris), 'Resurrection,' 'Christ and the Woman of Samaria' (in Vienna), and 'Massacre of the Innocents' (in Munich); but there is scarcely an important gallery in Europe which has not specimens of his work.

Carac'tacus, or **Cat'aractacus**, a king of the Silures in S. Wales, who raised himself above all the British chiefs, and proved a formidable foe to the Romans. At last he was overthrown, and his wife and children were made prisoners. His brothers surrendered. C. sought refuge with Cartimandua, Queen of the Brigantes, who betrayed him, 51 A.D. The Romans, after a nine years' war, returned to Italy, taking with them C. and others, with the view of exhibiting them to the Roman people; but so noble was the bearing and so manly the appeal of the conquered chief, that the Emperor Claudius granted them all a free pardon. There is no account of their return to Britain.

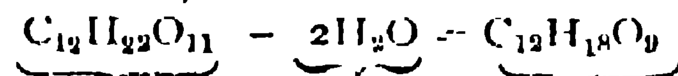
Car'adoc Sandstone and **Bala Beds**, a division of the Lower Silurian system, consisting, in Wales, of sandstone, grits, and slates, with interspersed limestones, and attaining a thickness of 5500 feet. This group in the N. of England is made up of black flaggy beds, limestones and shales, and mudstones, in which plentiful remains of Graptolites (q. v.) occur, along with Trilobites (q. v.) and Brachiopods (q. v.).

Caraga'na, the Siberian pea-tree, belonging to the natural order *Leguminosæ*. *C. arborescens* is a small tree, with hard wood and tough bark. The seeds are used to feed poultry, and the leaves contain a blue dyeing matter. *C. spinosa* is a thorny shrub, the branches of which are stuck plentifully on the tops of the clay walls about Pekin, in China, for the same reason that broken bottles are strewed on the tops of our garden walls in Britain.

Carai'pa, a genus of plants of the natural order *Ternströmiaceæ*, containing about eight species, natives of tropical America. *C. fasiculata* is the tree from which the balsam of Tamacoari is obtained. This balsam is of the colour of port wine and the consistence of oil. A single application will cure the most inveterate attack of the itch in twenty-four hours (Spruce, *Journ. Linn. Soc.*, v. 63).

Car'ambola, the fruit of *Averrhoa C.*, a small evergreen tree of the natural order *Oxalidaceæ*. In India it is known as the Coromandel gooseberry, and is used for making sherbets, tarts, and preserves. The *Blimbing* or *Bilimbi* is another species of the same genus (*A. Bilimbi*), found also in India. The leaves of both species exhibit irritability, and the physiological phenomenon known as the sleep of plants.

Car'amel is a black amorphous substance obtained by heating sugar to a temperature of 210-220° C. The sugar loses two molecules of water, and C. remains


$$\underbrace{C_{12}H_{22}O_{11}}_{\text{Cane sugar.}} - \underbrace{2H_2O}_{\text{Water.}} = \underbrace{C_{12}H_{18}O_9}_{\text{Caramel.}}$$

C. is soluble in water, and imparts to it the colour of sepia; it has no sweet taste; it is used to colour liquors, such as brandy, sherry, &c. Stout and porter owe their colour to C., produced by heating the malt (which contains sugar) to a somewhat elevated temperature.

Caramnass'a, or **Kurumnassa**, a tributary of the Ganges, rises in a range of hills in the W. of the province of Bengal, and enters the Ganges 50 miles E. of Benares, after a course of 150 miles. It is subject to sudden floods. The C. is crossed by the Calcutta and Delhi road, and by the East Indian Railway.

Caran'ja, an island, about 2 miles broad, on the E. side of the entrance to the harbour of Bombay, and separated from the mainland by a narrow shallow channel, 4 miles long.

Caranx. See SCAD.

Carapa, a genus of plants of the natural order *Meliaceæ*, natives of warm regions. *C. Guianensis*, the Andiroba, is a large tree, the bark of which has a reputation as a febrifuge; a thick, bitter, anthelmintic oil is obtained from the seeds, and the trunk makes good masts. The wood (called crab-wood) is used for making furniture, shingles, &c. *C. Guineensis*, an African species, also yields a similar oil (Tallicoonah or Coondi oil), with a soap made from which the negroes anoint their skin to protect them from the bites of insects. It is also purgative and anthelmintic. This and the preceding species are very closely allied, and have almost exactly similar products; so that it is doubtful if they are different from each other.

Car'apace, the name applied generally, in zoology, to the shell or hard structures covering the back of certain animals (*e.g.*, turtles, tortoises, crabs, &c.), which structures, however, differ widely in different groups as to composition and nature. See CHELONIA, CRUSTACEA, &c.

Car'at (Ital. *carato*), the twenty-fourth part of any weight of gold or gold alloy. The gold of coinage and of wedding-rings is 22 C.; that is, it contains $\frac{22}{24}$ of pure gold. The standard used for watch-cases is 18 C. In assaying gold, a small quantity, from 6 to 12 grains, is taken, and termed the *assay pound*. It is subdivided into twenty-four parts, called carats, each C. into 4 assay grains, and each grain into quarters, so that there are 384 separate reports for gold. If the assay pound be 6 grains, the quarter assay grain will weigh $\frac{1}{64}$ of a grain—a delicate operation, requiring accurate weights and scales. The word C., in addition to this relative application, also denotes a fixed weight of $3\frac{1}{4}$ troy grains for weighing diamonds.

Carava'ca, a town of Spain, province of Murcia, 39 miles N.W. of Murcia. The church of C. has a cross believed to possess miraculous powers, and an object of deep veneration to the Spanish peasant. The town has manufactures of woollen and

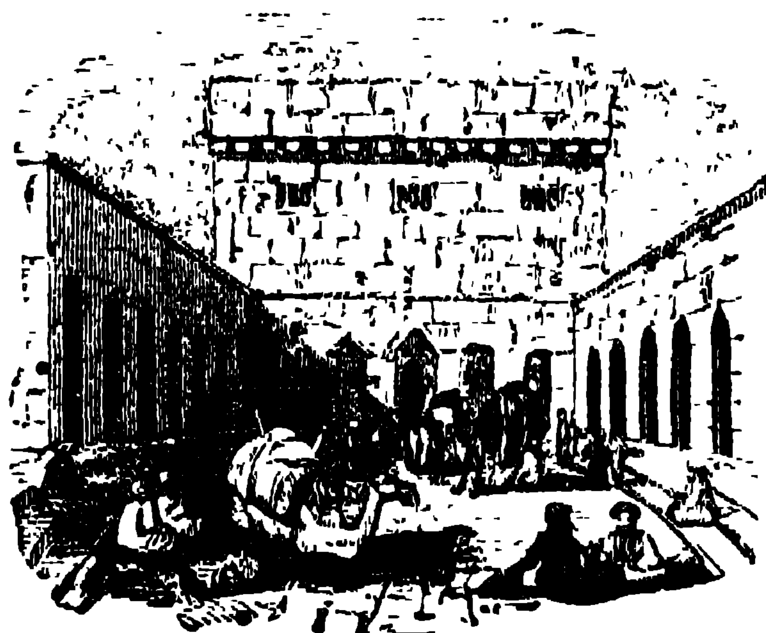
linen fabrics, leather, paper, &c., a trade in grain, oil, wine, and flax, and a pop. of about 10,000.

Caravagg'io, a town of N. Italy, province of Bergamo, 24 miles E. of Milan, with a pop. of about 6000. It is the birthplace of the Italian painters Polidoro Caldara and Michael Angelo Merighi, both of whom have taken a surname from the town.

Caravaggio, Michael Angelo Amerighi, or **Merighi**, styled *Da Caravaggio*, from the town in Lombardy where he was born in 1569. The son of a builder, he early consorted with decorators, developed a taste for art, and visited and studied at Milan, Venice, and Rome. His temper was vain, jealous, even ferocious, and having committed manslaughter, he fled from Rome to Malta. Here he adorned the Church of St John with an altar-piece, and was knighted by the Grand-Master; but quarrelling with a noble, was imprisoned. He escaped to Sicily, where he was followed, attacked, and wounded by the enemies whom his imperious temper had provoked. Making his way to Rome, he was attacked by fever, and died at Porto Ercole, 1609. C. was great as a colourist. Annibale Caracci says of him that, in preparing his colours, he 'ground flesh' (not pigments), and he was a master of light and shade to whom Rubens confessed himself inferior. He studied life, but it was low life, and his 'Burial of Christ' is said by Kugler to suggest 'the funeral of a gipsy chieftain.' Other famous works of C.'s are 'The Death of the Virgin,' 'The Distribution of the Rosary,' and 'The Gipsy.'

Car'avan (Pers. *karvan*, 'trader'), a travelling body of merchants or pilgrims, who join company for mutual help and protection in the great deserts of Africa and Asia. In a C. there are sometimes 1000 camels following each other in single file. The greatest caravans are those to Mecca, the pilgrims in which have always business as well as devotion in view. The trade between the maritime states of Northern Africa and the Sudan, over the Sahara, is still entirely carried on in this way, and there is also an extensive caravan traffic in the interior of Asia.

Caravan'serai (Pers. *karvan-sarai*, 'house for traders') is an unfurnished building used in the East for the reception and lodgment of caravans. Those in cities and towns have more conveniences than those on the highway, and in them a small sum a day for accommodation is generally charged. They are sometimes used as shops, stores, and even as exchanges. Neither in town nor on the highway does the traveller find in a C. anything of use for himself or his cattle, except, perhaps, a well; he has to bring the necessaries of life with him. Caravans belong either to Government or to some private individual, or they are the property of the mosque.


Caravanserai.

Car'away, the fruits of *Carum carui*, one of the *Umbelliferæ*, a native of middle and southern Europe and some parts of Asia, and now naturalised in many parts of Britain. Pliny says the name is derived from *Caria*. It is cultivated in Holland and Germany, and in the counties of Kent and Essex in England, for the sake of the fruits, which are medicinally carminative and tonic, and for sale to confectioners and perfumers, who use them in liqueurs, cakes, bread, scented-soap, sweetmeats, &c. Its aromatic properties depend on the volatile oil, called the Oil of C. In Russia and Germany the seeds are bruised into spirit sweetened with sugar, which is used as a liqueur (*Kümmelbranntwein*).

Carbazot'ic, or **Pic'ric Acid**, is a yellow crystalline substance, prepared commercially by the action of nitric acid on *phenol* or Carbolic Acid (q. v.), and may be regarded as phenol in which three atoms of hydrogen are replaced by the group NO_2. For this reason C. A. is called by chemists *trinitro-phenol*.

$C_6H_5(OH)$	$C_6H_2(NO_2)_3OH$
	
Carbolic acid or phenol.	Carbazotic acid or trinitro-phenol.

C. A. is employed by the dyer to stain silk yellow; it is sometimes fraudulently added to beer instead of hops, its solution having an intensely bitter taste.

Carbine, or **Carabine** (introduced in the 16th c. into French, and thence into English, from the Ital. *carabina*), a firearm with a rifled barrel, shorter than the musket or rifle. The cavalry (excepting the Lancers) and the artillery of the British army, as well as the representative corps in the auxiliary forces, are armed with breech-loading carbines, and similar weapons are carried by the Irish constabulary.

Carbineers', or **Carabineers**, light horsemen armed with carbines, and employed as skirmishers. Sir Joseph Meyrick states that the light cavalry, whose principal weapon was a short wheel-lock arquebus, in the service of Henri II. of France were called *carabins*; and another writer remarks that this body was disbanded in 1665, and their place supplied by infantry called carabineers. The 6th Dragoon Guards of the British army were early armed with the carbine, and hence they retain the name 'carabineers' as a distinctive title.

Carbohy'drogens, a term sometimes employed to denote the various compounds of carbon and hydrogen. They are more generally called the Hydrocarbons (q. v.).

Carbol'ic Acid, or **Phenol**, is a substance which of late years has become of great commercial importance. It is produced by the destructive distillation of many organic substances, especially of coal, and is always obtained in commerce from coal-tar. It is said to be present in the body of the beaver (*Castor Fiber*), and to give to that animal its peculiar odour. It is also present in the urine of the cow.

C. A. was first isolated by Runge, and first prepared for commercial purposes by Sell, in Germany. To Grace Calvert, however, belongs the merit of preparing it pure and in immense quantities. To extract C. A. from coal-tar (which contains from 3 to 14 per cent.), the tar is submitted to distillation, and the portion boiling from 150 to 200 collected separately. This is agitated with a strong and hot solution of caustic soda, some solid caustic soda added, and the whole allowed to remain at rest, when a copious separation of crystals of carbolate or phenate of soda ensues. These crystals are next separated from the mother liquor, and dissolved in a small quantity of water. After some time the solution separates into two layers, of which the lower is a solution of phenate of soda, whilst the upper consists of hydrocarbons, &c., mechanically entangled in the crystals. The solution of phenate of soda is drawn off and mixed with sulphuric or hydrochloric acid, when sulphate or chloride of sodium is formed, and remains dissolved in the water, whereas the C. A., being only sparingly soluble in that liquid, separates in globules, which gradually rise to the surface and collect in an oily layer. The crude C. A. thus obtained is decanted, dried with chloride of calcium, and rectified, after which it is cooled to 10° C., when pure C. A. separates in crystals. This acid is a colourless crystalline substance, which fuses when heated to between 34° and 35° C., and boils at about 187° C. It possesses a peculiar, penetrating, and characteristic odour. It blanches and corrodes the skin and other tissues, without causing the sensation of pain, hence it is employed in dentistry to destroy an exposed nerve. It is soluble in twenty times its weight of cold water, and in all proportions in alcohol, ether, and glacial acetic acid. C. A. is a hydrate of the hydrocarbon radical *phenyle* (C_6H_5), and has the composition represented by the formula $C_6H_5(OH)$. It should therefore be classed as an Alcohol (q. v.), but it differs from an alcohol in many important respects, and rather displays the properties of an acid. Thus it acts upon bases in such a manner that water separates and a salt results. It does not, however, redden litmus like a true acid. On account of its special properties, C. A., with other bodies analogous to it, form a separate group of chemical compounds, which receive the name of *phenols*. It is now employed in large quantities as a disinfectant and antiseptic, and as a source of various colouring matters.

Car'bon is one of the most plentiful and important of the sixty-four elementary bodies known to chemists. It may be considered as the principal constituent of animal and vegetable tissues, and it also enters largely into the composition of certain minerals, of which chalk may be instanced as a familiar example. In the free or uncombined condition C. exists in three distinct modifications. Two of these, viz., *Graphite* and *Diamond*, are found in nature, but the third, *Amorphous* C. or *Charcoal*, has only been obtained by artificial means. C. is thus an allotropic element. See ALLOTROPY.

The *Diamond* is a gem highly prized on account of its great brilliancy and hardness. It is found in alluvial deposits produced by the disintegration of the older rock formations. That the diamond is pure C. was first suggested by the discovery made by Lavoisier that the product of its combustion in air is carbonic acid. Later Sir H. Davy found that the volume of carbonic acid produced by burning a given weight of diamond was the same as that produced by the combustion of the same weight of charcoal. There is therefore no doubt as to the composition of the diamond, but its history remains in obscurity, for hitherto all attempts to prepare it by artificial means have failed. It is found, however, that some diamonds when burned leave an ashy skeleton resembling that of calcined vegetable matter; hence it has been suggested that the gem is produced by the gradual separation of C. from vegetable matter. The diamond is characterised by its extreme hardness and optical refrangibility, in both of which respects it is superior to any other substance. It is found crystallised in octohedra with rounded edges, and these natural edges are alone capable of cutting glass. It is denser than the other two varieties of C., its specific gravity being 3·5. See DIAMOND.

Graphite, *Plumbago*, or *Black Lead*, occurs in nature in rounded masses or in hexagonal balls. It is soft, opaque, of greyish black colour, and possesses metallic lustre. It leaves a black streak when rubbed on paper (black-lead pencils). It conducts electricity, and has the specific gravity of only 1·8–2·5. Cast-iron possesses the property of dissolving charcoal at a high temperature in considerable quantity, and of depositing it again on cooling in crystalline scales of graphite, which are technically called *kish*. When grey cast-iron is dissolved in an acid a deposit of graphite is left. Graphite, therefore, unlike the diamond, has been obtained by artificial means. See GRAPHITE.

Amorphous C., or *Charcoal*, is obtained by heating animal or vegetable materials in closed vessels. At a high temperature decomposition takes place; water, hydrocarbons, and other volatile products pass off in the state of vapour, and amorphous C. remains. There are several varieties of charcoal, the most important of which are the following:—

Wood Charcoal, obtained either by distilling wood in iron retorts, or by allowing it to undergo a limited combustion.

Coke.—The residue left when coal is distilled for the production of coal-gas.

Gas C.—A very compact variety of amorphous C. found adhering to the retorts in which coal is heated in the manufacture of coal-gas, and which owes its formation to the decomposition of the more volatile hydrocarbons by the high temperature of the walls of the retort. It is very hard and heavy (sp. gr. 2·35), and is used for making the C. plates of Bunsen's batteries.

Lamp Black.—The soot obtained by the incomplete combustion of resin, turpentine, &c.

Animal Charcoal, or *Bone Black*.—Obtained by heating bone in covered vessels or iron retorts. It is of especial value as a decolorising agent. See SUGAR-REFINING.

The compounds of C. are exceedingly numerous, and have characters of such special kinds, that their study alone forms a large and distinct branch of chemical science, which is called *Organic Chemistry*. The more important compounds and groups of compounds which C. forms with other elements will be found described under their respective headings. The atomic weight of C. is 12 and its symbol C.

Carbon, in medicine. Two kinds of C., or charcoal, are used in medicine—wood charcoal and animal charcoal. The former, obtained from wood charred by exposure to a red heat without access of air, and reduced to a fine powder, consists of 98 per cent. of C. and 2 of ash. It is given in doses of from 20 to 60 grains, and is a valuable remedy for flatulency of all kinds, and for correcting foul odours from the fæces. It is useful in most forms of Dyspepsia (q. v.), and is in general a good disinfectant, and a destroyer of bad smells. Externally it is much used as a poultice to foul and sloughing ulcers. It is also an excellent dentifrice.

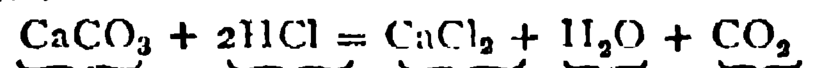
Animal charcoal is principally used in pharmacy for decolourising purposes in preparing vegetable alkaloids. It has no taste, is very cheap, and, either in the form of powder or biscuit, should be more used in dyspepsia. In large doses it is effective in poisoning with strychnine and other similar poisons.

Carbona'ri ('charcoal-burners') claim descent from an association of German charcoal-burners in the 12th c. They are probably connected with *Le Bon Cousinage* of the *Fendeurs* (Hewers) of the Jura. Their legends name as patrons a St Theobald of Suabia and Francis I., from whose reign their almanacks date. The C. first emerge into political importance as a secret society in S. Italy and Sicily at the beginning of the 19th c. A charter, which probably belongs to the reign of Murat, proposes the establishment of an Ausonian Republic in Italy, the Christian religion being retained, but the Papal power and feudalism being abolished. It is said that the Bourbons having promised a constitution, the C. rose against Murat, their failure causing a separation from the main body of the Calderari (Braziers). Ferdinand, on his restoration, resolved to suppress those who had fought for him, and in 1819 his Minister of Police, Prince de Canova, employed the Calderari for this purpose. The Cadiz insurrection gave fresh life to the C. under the Abbé Menichini, and with the help of 'Le Giardiniere' (the Lodges of Garden-women) a second unsuccessful attempt was made to obtain a constitution. In the Papal States also the C. rose at Macerata and Faenza, but they were opposed by the orthodox society of the Sanfedisti, and their leaders betrayed. The action of the Lombardy and Venetian lodges against the hated rule of Austria was paralysed by the capture of Silvio Pellico, Torelli, &c. Carbonarism was introduced into France about 1820 by Joubert and Dugier. It is said that Lafayette was elected president. At Belfort the society was concerned in an insurrection (1821). Paris was their headquarters until after the revolution of 1830, when the society of 'Young Italy,' for the unification of Italy, was separately organised, and the advanced 'Charbonnerie Démocratique' was founded in Paris to realise the sovereignty of the people. In 1831 the C. had driven Maria Louisa, Duchess of Parma, into exile for a short time. The ceremony of initiation in the vendita (or lodge) was full of symbols: a linen cloth, water, salt (this means Christianity), leaves, fire, a crown of white thorns (the struggles of the Good Cousins), were all used by the Grand Master. The martyrdom of Christ is dwelt upon in the 'second degree' of initiation. The degree of 'Grand Elect' was conferred upon a solemn oath to fight to the death for universal liberty, if necessary, under the penalty of death with torture. The 'Grand Master Grand Elect' underwent a ridiculous mock crucifixion before attaining the highest degree. All members had pseudonyms, the register of real names being concealed in a separate place. There were also officers called insinuators, censors, coverers, and scrutators, the lowest grade being 'stabene,' or sedentaries. The 'Guelphic Knights' formed a sort of 'high lodge' of the C. Their supreme council sat at Bologna, the council consisting of six persons, who did not know each other, but communicated by means of an officer called the 'Visible.' The 'Delphic Priesthood' and the 'Latini' were also branches of the C. The 'Fratres' of Milan, the 'American Hunters' of Ravenna, the 'Sons of Mars' (who called their 'vendita' a *bivouac*, and their 'Good Cousin' a *corporal*), were later offshoots. In fact, Italy was a network of conspiracies. When Francis II. left Naples in 1860, the predominant society was the Camorra, of which the leading members have been lately arrested. It is said that Count Rossi was murdered by C. A vivid picture of the atmosphere of suspicion and deception which prevailed in Sicily at the beginning of this century may be found in George Sand's *Le Piccinino*. The C., under the name of *Francs Maçons* in France, *Illuminés* in Germany, 'Radicals' in England, *Communeros* in Spain, have been specially condemned by Papal constitutions, as by Clement XII. in 1738, Pius VII. in 1821 (who says the C. are sprung *de' liberi muratori* condemned by Benedict XIV.), Leo XII. in 1826 (who mentions the *Universitaires* as a new and dangerous branch). So also in the Encyclic of 1864, '*damnantur clandestinæ societates*.'

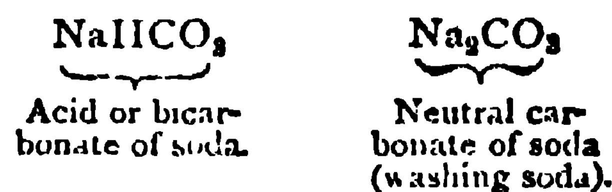
Carbona'ted or Acidulated Waters are natural waters containing generally, in addition to saline compounds, an excess of carbonic acid gas, which causes them to effervesce at ordinary atmospheric pressure like artificial äerated waters. The water at Tunbridge Wells is an example of a C. chalybeate spring, and the alkaline waters of Vichy, Seltzers, Vals, Homburg, &c., contain large proportions of carbonate of sodium in addition to carbonic acid. The quantity of carbonic acid given out by some springs is enormous, amounting yearly to hundreds of tons. The waters of Neusalzwerk and Nauheim are said respectively to yield as much as from 1300 to 2000 tons of carbonic acid gas per annum. A considerable trade in natural C. waters now exists between Great Britain and the most famous Continental spas.

Carbon, Bisulphide of, is obtained by dropping sulphur into red-hot charcoal in an earthenware retort provided with a good condensing apparatus. It is a colourless, mobile liquid, highly refractive and volatile (boiling point, 48° C.), and possesses a peculiar aromatic odour, which is not disagreeable if the bisulphide be quite pure, but is usually disagreeable from the presence of impurities. B. of C. is an excellent solvent of oils, fats, resins, caoutchouc, phosphorus, sulphur, &c., and is employed in the manufacture of vulcanised india-rubber.

Carbon'ic Acid, or **Carbonic An'hydride,** formerly called *fixed air*, is a gaseous compound of carbon and oxygen, the composition of which is represented by the formula CO_2. C. A. occurs plentifully in nature, both in the free and combined conditions. It is produced by the processes of Combustion (q. v.) and Respiration (q. v.), hence is always present in the air, though in minute quantity. The amount of C. A. in air would be much larger than it is were it not for the presence of plants, which absorb it into their tissues, there abstract and assimilate its carbon, and return its oxygen to the atmosphere in a pure condition. C. A. is also present in spring water, sometimes in such quantity that the water effervesces or sparkles; this is the case with the springs of Pyrmont, Nauheim, &c. It is also produced during the processes of putrefaction, fermentation, and slow decay of animal and vegetable substances in presence of air. Compounds of C. A. with various bases are found in large quantities in nature. Chalk, limestone, marble, Iceland spar and marble, are all of them carbonate of calcium, a compound of C. A. with the base lime. Carbonate of iron (spathose iron ore) and carbonate of calcium and magnesium (dolomite) are also important minerals containing this substance. C. A. may be prepared for experimental purposes by acting upon a carbonate with a dilute mineral acid: marble and dilute hydrochloric acid may be employed with advantage. If these be taken, the chemical reaction which occurs is as follows:—

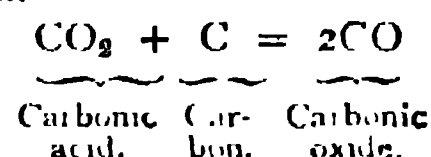


C. A. under ordinary conditions is a colourless gas of sweetish taste. It is not poisonous, but acts in exactly the same manner as water when introduced into the lungs, that is to say, prevents the blood from absorbing oxygen, and eventually causes death by Asphyxia (q. v.) or suffocation. If subjected to extreme pressure (39 atmospheres at 0° C.), it condenses to a colourless very mobile liquid, which by its rapid evaporation when the pressure is removed produces such a low temperature that the remainder is frozen to a snow-white solid. The lowest temperature ever obtained was produced by mixing solid C. A. with ether. C. A. is remarkable for its high specific gravity. It may be poured like water from one vessel to another. This property causes it to accumulate in holes and caverns, and many accidents have occurred through incautiously entering such localities. The introduction of a lighted candle into places in which accumulations of C. A. are suspected is a simple test for its presence in dangerous quantity, for then the flame is extinguished. It is slightly soluble in water under ordinary conditions, but its solubility is greatly augmented if it be forced into the water under pressure, though on removing the pressure the water effervesces from the disengagement of the gas. This property is turned to account in the manufacture of Aerated Waters (q. v.). It is remarkable that the introduction of C. A. into the lungs should be so deleterious, whereas if introduced into the stomach it acts beneficially as a tonic and gentle stimulant. C. A. forms two classes of salts with bases—*neutral* and *acid* carbonates. The formulæ for the two salts of soda are—

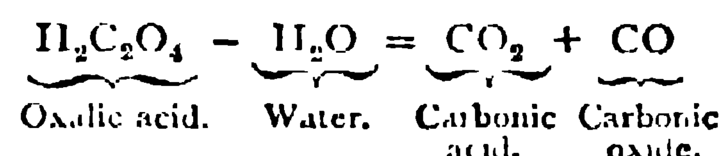


C. A. is absorbed with great activity by the alkalies and alkaline earths, a property which is utilised in the determination of this gas, and in its separation from other gases. It is largely employed by the manufacturers of äerated bread and äerated waters.

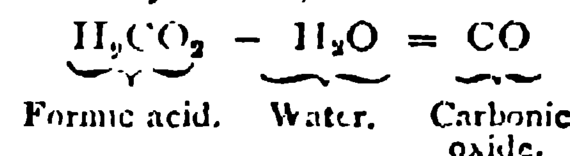
Carbon'ic Ox'ide is a compound of carbon and oxygen, the composition of which is represented by the formula CO, whereas that of carbonic acid is represented by the formula CO_2. C. O., therefore, contains half as much oxygen as carbonic acid. It was discovered towards the end of the last century by Priestley and Lassonne, but was first accurately investigated by Woodhouse some years later. It may be obtained by passing carbonic acid over red-hot charcoal.



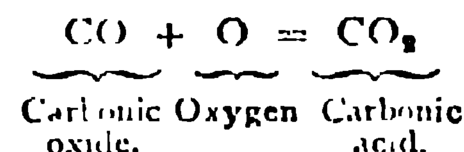
The blue flame often seen playing over a clear fire is due to burning C. O. produced by the reduction of carbonic acid formed in the lower part of the fire during its passage through the red-hot coals. C. O. may also be obtained, mixed with carbonic acid, by heating crystallised oxalic acid with strong sulphuric acid, the latter simply removing a molecule of water from the oxalic acid.



The C. O. may be separated from the carbonic acid by passing the mixed gases through a solution of caustic potash, which only absorbs the latter. It may be obtained in a state of purity by heating formic acid with strong sulphuric acid, the action being simply one of dehydration, as in the former case.



C. O. is a colourless, tasteless, and odourless gas, which cannot be liquified. It is inflammable, and burns with a pale blue flame to carbonic acid.



Owing to its strong affinity at a high temperature for oxygen, C. O. plays an important part in the reduction of iron and other metals from their oxides. (See IRON and BLAST FURNACE.) It acts as a narcotic poison, and in this respect differs from carbonic acid, which possesses no poisonous properties, but which, like water, cannot be introduced into the lungs without causing suffocation. Many deaths have occurred from incautiously sleeping in badly-ventilated rooms in which charcoal fires are burning—death resulting, in such cases, not from the action of the carbonic acid, but from that of the carbonic oxide.

Carbonif'erous System, the term applied to those formations, generally of characteristic and independent kind, which overlie the Devonian or Old Red Sandstone rocks, and which in turn lie beneath those of the Permian system. The name 'C.' is derived from a principal feature in their chemical composition, in virtue of which they become of high importance to man, as providing him with a chief source of coal. Lime and iron may also be enumerated among the industrial products of this system. Coal, however, it is to be remembered, is not confined to these rocks, but also occurs in newer as well as older and different strata. A great proportion of this system of rocks, indeed, is made up of sandstones, shales, and limestones, the coal occurring in comparatively thin beds. These rocks are largely developed in Britain, Europe generally, and N. America. In India (as at Damoodah, Nagpur, &c.) large coalfields occur, and in Australia this system is also represented. The C. rocks are divided into the

(1) lower C. rocks (C. slates and mountain limestones), (2) the millstone grit, and (3) the coal measures. The first-mentioned strata, constituting the base of the system, attain a thickness in Ireland (*C. slates*) of 5000 feet. The *C. limestone* in its typical development, as seen in Wales and the W. of England, is a pure limestone, from 1000 to 2000 feet thick, with beds of shale. The *millstone grit*, lying above the C. limestone, consists of sandy and gritty beds, lying either conformably or uncomformably on the latter, and averaging about 1500 feet in thickness. Fossils are scarce in these strata. The *Coal measures* lie conformably above the millstone grit, and consist of a thick series of beds of sandstone, shale, grit, and coal. From these measures true coal is chiefly obtained, but in Scotland workable seams occur below the millstone grit. In their greatest development the C. measures attain a thickness of from 7000 to 15,000 feet. Their shales are black, laminated, and earthy; their sandstones are yellow, brown, and purple, and rarely red; and beds of limestone and of clay-iron ore occur, along with the typical coal-beds of various thicknesses. The S. Wales coalfield shows alternating series of sandstones, shales, and coal, the latter beds numbering about eighty in this field alone. Each coal-bed rests upon sandy shale or clay, termed the 'floor,' which contains *Stigmaria* fossils, or the roots of the *Sigillariæ* (q. v.). A bed of shale—the 'roof'—lies above each coal-seam, and contains numerous plant fossils.

The C. period is chiefly notable as presenting us with a large and varied assemblage of fossil plants—Ferns, Calamites, Lepidodendra, Sigillariæ, &c. Cryptogamic vegetation flourished plentifully in this epoch. The *Protozoa*, or lowest animals, are represented by Sponges, Foraminifera, &c.; the *Cœlenterata* by Corals, &c; the *Echinozoa* by Crinoids and other genera; the *Annulosa* by Crustacea (*Trilobites*, &c.), Insects, Arachnidans, and Myriapods; the *Mollusca* by Polyzoa, Brachiopoda, Bivalves, Gasteropods, and Cephalopods; and the *Vertebrata* by Ganoid and other fishes, Amphibia, and probably true Reptiles.

Car'buncle (Lat. *carbunculus*, 'a small coal'), the lapidary and jeweller's name for a variety of the Garnet (q. v.), which is cut *en cabochon*. It is of a bright red hue. The mineralogists call it *pyrope*. The C. was a favourite gem among the ancients.

Carbuncle, in medicine, sometimes called *Anthrax*, a Greek word also meaning 'coal,' is essentially an inflammation of the skin, limited in extent, occurring most frequently in the same parts as *Boil* (q. v.). The skin, which assumes a bright red colour, becomes very much thickened by the infiltration of the inflammatory products, sometimes more than one inch in thickness. The C. is accompanied by burning pain, and a sense of tightness in the parts, together with great constitutional disorder. If left to itself, it is apt to slough, and ultimately to involve the deeper tissues, forming an abscess. It is generally single, and varies very much in size. The affection is most common in middle life and in advanced years, especially among those who live sumptuously. The treatment consists in free and early incisions through the whole diseased mass, followed by the application of soothing poultices, when the mass gradually sloughs out. At first a brisk purge is beneficial, after which tonics and nourishing, non-stimulating food should be administered to the patient.

Car'burretted Hydrogen. Although this term might be employed to designate any of the numerous compounds of carbon and hydrogen, it is restricted by long custom to two of these only—viz., *light* C. H., or *Marsh Gas* (q. v.), CH_4; and *heavy* C. H., *Ethylene* or *Olefiant Gas* (q. v.), C_2H_4.

Carcajen'te, a town of Spain, province of Valencia, in a fertile plain near the right bank of the Jucar, 25 miles S. of Valencia, with which it is connected by railway. The Marquis of Calzada has a large palace here. The trade of C. is chiefly in grain, fruit, and silk. Pop. 7280.

Car'canet (Fr. a diminutive of *carcan*, 'a collar;' Old Fr. *quercant*, from Old High Ger. *querca*, 'the throat'), a jewelled chain or necklace, for the manufacturing of which Venice was famous in the 15th c.

Car'cass, in ammunition, a thick cast-iron spherical shell discharged from mortars and other smooth-bore ordnance for incendiary purposes. It is filled with a composition consisting of saltpetre, sulphur, rosin, antimony, sulphide, turpentine, and tallow, which is ignited by means of a quick-match placed in three vents on the upper hemisphere, through which the composition continues to burn for from three to twelve minutes, according to the size of the projectile. Previous to the present century, oblong carcasses encircled with iron bars covered with canvas and cord were in use in the British service, and it is supposed that the term 'C.' refers to the *ribs* of iron and *skeleton* frame of these obsolete 'fire-balls.'

Carcassone', the capital of the department of Aude, France, on both banks of the Aude, 55 miles S.E. of Toulouse by railway. It consists of an ancient and a modern portion. The former still retains the old fortifications, the castle and donjon, which made it a place of importance from the earliest times down to the 14th c. It contains also the splendid old cathedral of St Nazaire, rebuilt in the 11th c., and it communicates by two bridges with the modern town, which is regularly built. C. employs 2000 persons in the manufacture of cloth, which it exports in large quantity to America. It has also much trade in grain, fruit, and wine. Pop. (1872) 18,396. C., the ancient *Carcasso*, was in existence before the Romans entered Gaul. It suffered greatly during the Albigensian wars.

Car'damine, a genus of plants belonging to the natural order *Cruciferæ*. The best-known is *C. pratensis*, the bitter cress, cuckoo-flower, or lady's smock, common in most meadows in Britain. The flowers are stimulant and diaphoretic; at one time they were held in high esteem as a cure for epilepsy, especially in children. The leaves of this species, as well as of *C. amara* and *C. hirsuta*, are occasionally used as salads, *C. amara* being especially popular in Saxony. *C. pratensis* is much used as an anti-scorbutic in the N. of Europe. The names of 'cuckoo-flower' and 'lady's smock' are said to be due to the fact that *C. pratensis* flowers at the time of the coming of the cuckoo, and covers the meadows with its flowers so profusely as to look at a distance like linen bleaching. On the Scottish borders it is known as *pinks*, *spinks*, *bog-spinks*, or the *Mayflower*. It is the 'lady's smock' of the English poets.

Car'damoms are the dried capsules, with their contained seeds, of certain plants of the natural order *Zingiberaceæ* (q. v.). Various species of *Amomum* and *Elettaria* yield C. *Amomum cardamomum* yields the C. of Siam, Sumatra, and Java; *A. aromaticus*, the Bengal C. Medicinal C. are got from *Elettaria cardamomum*, the Malabar C. These plants are natives of certain forests on the Malabar coast, 3000 to 5000 feet above the level of the sea. The seeds are angular and corrugated, with an agreeable taste and smell. They are best kept in their capsules until required for use. They owe their virtue to a colourless volatile oil, $C_{10}H_{16}$, constituting about 4 per cent. C. are good stomachics, make a pleasant cordial, and are extensively used as a condiment for correcting the griping of purgative medicines, and for rendering other medicines palatable.

Cardan, Geronimo, an Italian physician, philosopher, and mathematician, was born at Pavia, September 24, 1501. He took the degree of M.A. at Venice in 1524, and that of M.D. at Padua in 1525. The greater part of his life was spent at Milan, whither he went in 1529, and where he held for a time a chair of Mathematics. Here he compiled the *Ars Magna, Sive de Regulis Algebraicis* (1545), a work which placed him in the front rank of mathematicians, and his *De Subtilitate Libri XXI.* (1550), considered by some to be his most important work. Like the *De Rerum Varietate Libri XVII.* (1557), it enables us to see the extent of C.'s knowledge in physics, metaphysics, and natural history. In 1552 he visited Scotland, and, returning by England, predicted, upon astrological principles, that Edward VI. would have long life. After travelling in France, Germany, and other European countries, C. returned to Milan, where he remained till 1562, when he went to Bologna. The last six years of his life he spent as a pensioner of Pope Gregory XIII. at Rome, where he died, September 21, 1576, some say of voluntary starvation, in order to fulfil his own prediction of the time of his death. His name is best known in the mathematical world in connection with a rule for solving cubic equations, also known as Tartaglia's rule. His writings are extremely numerous, but are not of great value. Upwards of 220 on all sorts of subjects have been printed. The best edition is that of Sponius (10 vols. Lyon, 1663). See Crosley's *Life and Times of C.* (2 vols. Lond. 1836).

Card'board, Card, or Pasteboard, is made by pasting several sheets of paper together, and pressing, drying, and rolling the board so produced. In C. the layers of paper are usually of an uniform good quality, and, when pressed and dried, a fine smooth polished surface is imparted by passing a pile of cardboards and heated zinc or copper plates, arranged alternately, between a pair of rollers. *Ivory C.*, a fine thin variety used for address cards, consists of two or more sheets of fine paper, rolled till a beautiful hard smooth surface is obtained. Enamelled address cards are made by coating the card with a white mineral composition, and rubbing with a hard brush. In coloured cardboards the outer sheets only are tinted. Pasteboard is made with a 'middle' of inferior quality to the outsides, and in thick boards two or more 'middles' are pasted together.

Car'diac Medicines are remedies which influence the action of the heart either directly or indirectly.

Cardiadæ, a family of *Lamellibranchiate* molluscs, represented by the Cockles (q. v., *Cardium*) and by the genus *Conocardium*. The shell is equivalve, heart-shaped, the mantle being open in front, and the foot large and curved. The family is represented by cockles on the Devonian rocks; whilst the genus *Conocardium* is represented by Palæozoic shells, which have the anterior side of the shell conical and gaping, and a siphonal tube placed near the beak of the shell.

Cardiff (Cymr. *Caer-Taff*, 'castle on the Taff'), the county town of Glamorganshire, S. Wales, on the Taff, 1½ miles above its entrance into Penarth harbour, and 170 miles W. of London by railway. It is rapidly becoming one of the first ports in the kingdom, being the outlet for the extensive iron and coal industries of S. Wales, including the richly-productive districts of Merthyr-Tydvil, Rhymney, the Rhondda and Aberdare Valleys, &c. It has a large town-hall, a custom-house, a free library and museum, a good infirmary, a county lunatic asylum, and a theatre. Of some thirty churches in C., only four belong to the Establishment. The splendid docks of C., the cause of its recent prosperity, are mostly the property of the Marquis of Bute, and have been brought to their present state in a great degree by his personal enterprise. There are in all three so-called Bute docks, Penarth dock, several graving and other docks, having a total area of 100 acres. The quays have some forty staiths, worked by hydraulic machinery for the expeditious loading of coal without breaking it. By means of these staiths vessels can be loaded at the rate of 100 tons an hour. In 1873 the export of coal was 3,591,218 tons, of iron 154,570 tons, and of coke 12,276 tons. In the same year there entered the port 9951 vessels, with a total of 1,644,908 tons, of which 1488, of 485,561 tons, were foreign, chiefly French; while there cleared 11,333 vessels of 2,544,283 tons, 2290 (771,296 tons) being foreign vessels. There are regular steam lines to New York, London, Liverpool, Cork, Glasgow, &c., besides ample railway and canal communication with the interior. C. issues two daily newspapers. The rapid growth of C. is shown by the following figures:—In 1807 the pop. was only 1870, in 1841 it had increased to 10,077, in 1851 to 18,351, in 1861 to 31,235, in 1871 to 39,536, and in 1876 is estimated at about 60,000, including the suburbs of Roath and Canton. Along with Cowbridge and Llantrissant, C. returns one member to Parliament. C. is an ancient town, although little of its antiquity remains, and its history is bound up with that of its castle, which has been renovated by the Marquis of Bute. The most striking feature of this structure is a massive square tower, surmounted with a clock and gilt emblematic devices. In the interior are several apartments, fitted up in a costly style for the convenience of the noble proprietor. A public garden and park skirt the opposite side of the river to that on which the castle stands.

Car'digan (Cymr. *Caerdigion*, 'Caeredig's land'), or **Aberteify** ('the mouth of the Teify'), the capital of Cardiganshire, picturesquely situated on the Teify, 30 miles N.N.E. of Pembroke, and 240 N. by W. of London, with which places it is connected by railway. It lies 3 miles from the mouth of the river, which is here crossed by an old stone bridge of seven arches. Its harbour is greatly obstructed by a bar, but some trade is still carried on in the export of slates, oats, butter, &c. In 1873 there entered the port 909 vessels of 26,626 tons. C. possesses the scant remains of the Abbey of St Dogmaels, and the still scantier traces of a Norman castle, supposed to date from 1160. Along with Lampeter, Aberystwith, and Adpar, it returns a member to Parliament. Pop. of municipal borough (1871) 3461. C., which is an ancient town, strenuously opposed the intrusion of the Normans.

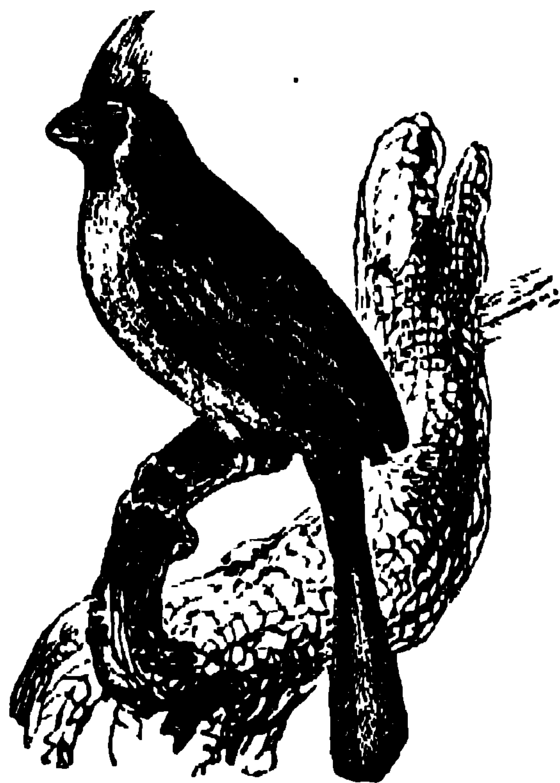
Cardigan Bay, a splendid inlet of St George's Channel, on the W. coast of Wales, extends from Brach-w-Pwll in Caernarvon to Strumble Head in Pembroke, a distance of 55 miles. It has from 3 to 30 fathoms of water, but the harbours on the coast are mostly obstructed by bars. C. B., according to Welsh tradition, was originally dry land (*Cantrev y Gwælod*), protected from the sea by dams and dykes till the 5th or 6th c.

Car'diganshire, a maritime county of S. Wales, lies between the rivers Dovey and Teify, and has an area of 693 sq. miles, and a pop. (1871) of 73,441. Its surface is chiefly level and fertile towards the coast, but the interior is mountainous; hence its popular name, 'Wild Cardigan.' C. has several rivers besides the Teify, of which the chief are the Claerwen, Ystwith, and Rheidol. In the hilly region are many famous waterfalls, as the Devil's Bridge and the Falls of Rheidol, and also some twenty beautiful llyns or diminutive lakes. In 1873, 265,554 acres were under crops and grass, the chief crops being oats, barley, and potatoes. There is a small hardy breed of cattle and horses. Almost the only manufactures of importance are flannels and gloves. The geological formation of C. is wholly Silurian, and the minerals include silver, copper, lead, and slates. One member of Parliament is returned by the county. C. was at one time under a native king (Rhodri Mawr, or Rhodri the Great), who extended his rule over all Wales in the 9th c. During the 11th, 12th, and 13th centuries it was the scene of desperate fighting between the native chiefs and the Norman settlers. There are still many Roman and British remains, including camps, roads, stone circles, and cairns.

Car'dinal (Lat. *cardinalis*, 'principal,' from *cardo*, 'a hinge,' as in *missa cardinalis*, 'solemn mass,' *altare cardinale*, 'chief altar'), a title originally applied in the time of Theodosius to generals of the imperial army, and also to the prefects of Asia and Africa. In the Church, the name was given generally to the parochial priests in towns, to distinguish them from the deacons, who had charge of hospitals for the poor, and from the chaplains of the oratory (where mass was said but no sacraments given). *Cardinalis sacerdos* was applied to a bishop, presbyter-cardinal to a parish-curate. Gradually, however, the name was limited to the priests of Rome who assisted the Pope in celebrating mass. From these, and not from the bishops, the Pope was generally elected. When a regular Curia was established, the cardinals were appointed by the Pope indifferently from Roman and foreign priests. But in 1159, when Nicholas II. excluded the common clergy, the nobility, and the people from the election of Pope, twenty-eight of the cardinals were apparently parish priests of Rome, the remainder being the collateral, hebdomadary, or comprovincial bishops of Ostia, Porto, Sylva, Candida, Albano, Sabina, Frascati, and Palestrina. The resistance of the Palatine judges prevented the definite organisation of the Sacred College till Alexander III., who gave the exclusive right of electing a Pope to the cardinals. The number of cardinals was only twenty-five in the time of Leo X.; latterly it became seventy (the number of elders chosen by Moses)—there being always about fifty priests (*clerici*), and from fourteen to eighteen deacons. In 1245 the red hat was adopted; in 1464 a red gown In 1630 Urban VIII. introduced the title of Eminence in place of Most Illustrious. Besides the cassock (*soutane*) and the short mantle (*mantelet*), the rochet and the cope (*chape*), the *cappa magna* and gold ring with sapphire are characteristic parts of the C.'s dress. Regulars always retain the dress of their order. The business of the C. is transacted in different congregations. Before Sixtus V. at least seven important congregations existed: those regarding the Inquisition, the Index, the affairs of councils, the bishops, the monks, the Segnatura, and the Consulata. Sixtus added congregations to deal with the removal and appointment of bishops and the revival of Church usages, and six secular congregations to deal with corn laws, roads, repeal of oppressive taxes, building of ships of war, the Vatican press, and the University of Rome. The Congregation of the Pope, or the Consistorial, prepares matters afterwards submitted to the Consistory, in which the Pope presides. When the Pope appoints a C., he presents him

in Consistory with the words '*habebitis fratres.*' The power and character of the cardinals have varied very much from time to time. It was the great Cardinals Contarini, Caraffa, Pole, Giberto, &c., who conceived the reforms for which the Council of Trent was summoned. When the Inquisition was revived (21st July 1542) after the Ratisbon Conference, six cardinals (including Caraffa and Toledo) were appointed commissioners of the Apostolic See, and general and universal inquisitors on both sides of the Alps. At other times the cardinals had little power. France and Austria have a right to present cardinals for nomination. The *cardinal's option* means that at the death of one C. his title may be taken by another, who gives up his own.

Cardinal, or Red Bird (*Cardinalis Virginianus*, or *Guarica cardinalis*), a species of *Insessores*, belonging to the *Conirostral* section of that order, and included in the *Fringillidæ* or Finch family. It is also known by the names C. Finch, C. Grosbeak, and Virginian nightingale. It inhabits N. America, and derives its name from the feathers of the crest being elongated to form a pointed cap-like structure. The male is coloured red, the head being of a bright vermilion hue, and the base of the bill black. The C. averages a starling in size. Its song is extremely sweet and powerful.



Cardinal Bird.

Cardinal Flower. See LOBELIA.

Cardinal Vir'tues. The classification of duties into the four C. V., Prudence, Courage, Temperance, Justice, was the scheme adopted in the oldest systems of ethics. Nowadays it is considered useless; modern Christian moralists usually adopt the system of duties to God, to others, to self. The first statement of the C. V. is found in Plato, according to whom the happiness of the man, as well as of the commonwealth, was to be attained by realising them. In answer to the question what is justice, he constructs his model or ideal republic by assimilating an individual to a state. Justice is defined as every man attending to his own business; injustice occurring when any one abandons his post or meddles with what does not belong to him. Such is justice in the state, and the same is justice in the individual; a sort of balance or harmony of the mental powers being to the mind what health is to the body. Wisdom, reason, or intellect was the highest faculty (Prudence), which was to control the two lower, Courage and Appetite. Courage, energy, or spirit, was the military virtue. Temperance was to restrain a many-headed appetite.

The Stoics adopted the four C. V.—Wisdom or the knowledge of good and evil, Justice, Fortitude or Courage, and Temperance—as part of their plan of the virtuous life. Epicurus also adopted them, and explained them from his own point of view. Prudence was a calculation and balancing of pleasures and pains, teaching men to select pleasures judiciously, to forego idle wishes, and despise idle fears. Temperance was the management of sensual pleasures in such a way as on the whole to extract from them the greatest possible amount of pleasure. Fortitude consisted in facing danger and enduring pain; Justice, in a tacit agreement among mankind to abstain from injuring one another. In the scholastic systems of ethics, to the four C. V. were added the *virtutes adjunctæ* or theological virtues, Faith, Hope, and Love. Later moralists all found this classification more or less inadequate to express their views. The virtue which was most conspicuous by its absence from the earliest ethical systems, and which modern thinkers have included in theirs under one name or another, was Benevolence. Accordingly Whewell, who preserved the name of C. V., enumerates *five*; Benevolence, Justice, Truth, Purity, and Order (obedience to the laws), which have a certain parallelism to the five chief classes of motives respectively—love and its opposite, mental desires, the need of a mutual understanding, bodily appetites, and reason. See Bain's *Mental and Moral Science* (1868).

Car'ding, a process by which cotton, flax, and short woollen fibres are prepared for spinning. In the case of cotton, the fibre is passed through an *opener*, in which refuse is beaten out, and then prepared for C. in a *scutcher*. In C. it passes through two different C.-engines of similar construction—the '*breaker*' and the '*finisher*.' From the breaker it is delivered in long slender coils called slivers, two of which are mixed in the *doubler*, and again spread out in the '*finisher*,' from which similar slivers are delivered. The object of C. is to produce slivers of uniform size, and to comb out the fibres in a parallel direction. See COTTON MANUFACTURE, &c.

Car'diograph. This is an instrument used in practical medicine and in physiological research for observing and recording the impulse of the heart on the wall of the chest. In man and in the lower mammalia, the heart is situated in an irregularly wedge-shaped space, the posterior wall of which is formed by the diaphragm. When the ventricles of the heart contract, they push against the wall of the chest with more or less violence. This push is termed the *cardiac impulse*. Various cardiographs have been employed, but the one most in favour was devised by Burdon Sanderson. It consists of a hollow disk, the rim and back of which are made of brass, while the front is made of thin india-rubber. This box is called the tympanum. To the brass back a flat steel spring is secured, which is bent twice at right angles in the same direction, in such a way that it overhangs the india-rubber membrane. The extremity of this spring, which is exactly opposite the centre of the face of the tympanum, is perforated by a steel screw, the point of which rests on the membrane, while its head is surmounted by an ivory knob. The tympanum is further provided with three adjusting screws, by which, when in use, it rests on the wall of the chest, with its face parallel to the surface, and can be approximated or withdrawn at will. It is evident that when the screws are so adjusted that the spring presses on the chest, whatever movements of expansion or retraction are made by the surface to which it is applied are communicated to it, and by it to the india-rubber membrane with which its point is in contact. The cavity of the disk communicates by a vulcanised india-rubber tube with a second tympanum in such a way that the two tympana and the tube enclose an air-tight cavity. The result of this arrangement is that whatever movement is performed by the first is simultaneously reproduced, but in the reverse direction, by the second. If the tympana are of equal area, the extents of the primary and secondary movements are equal. When, as is usually the case, the areas are unequal, the extent of movement is approximately inversely proportional to the areas. The movement of the second tympanum is magnified and inscribed on a registering cylinder by means of a lever. By this apparatus a tracing is obtained, which is an exact representation of the movements of the surface against which the spring is applied, so that, if the instrument is graduated, it may be used not only for the purpose of estimating the relative duration of those movements, but for measuring their extent. See *Handbook for Physiological Laboratory* (Lond. 1873) p. 255.

Cardiosper'mum, a genus of plants of the natural order *Sapindaceæ*, contains about twelve species, mostly natives of S. America, but also found in every tropical country. The leaves of *C. Halicacabum*, the winter cherry (a name also applied to *Physalis*) or heart-pea, are cooked and eaten in the Moluccas, and on the Malabar coast are taken internally with castor oil for lumbago, &c. The root is laxative, diuretic, and, owing to the quantity of mucilage in it, demulcent, but slightly nauseous in taste. It is also used in rheumatism.

Cardi'tis, inflammation of the substance of the heart, is an exceedingly rare affection, but several cases have been recorded. It may occur without any of the other structures being inflamed, but is more frequently combined with Endocarditis (q. v.) and Pericarditis (q. v.), with both of which it is often confounded. C. is sometimes the result of rheumatism.

Car'dium and **Cardia'ceæ.** See COCKLE.

Cardo'na, a walled town in the province of Barcelona, Spain, on the Cardener, 35 miles S. of the French frontier, with a trade in salt, obtained from a mountain of the mineral in the vicinity. This singular mass is 500 feet high, and in sunlight forms a dazzling spectacle. Pop. about 3000.

Cardoon' (*Cynara Cardunculus*), a genus of plants belonging to the natural order *Compositæ*, and resembling the artichoke in appearance. The C. is cultivated for the sake of its blanched leaf-stalks and midribs, which are used as a salad or as a pot-herb.

Cards (Fr. *carte*, Lat. *charta*) for play, like chess, are an importation from the East, and were probably invented in India. The Royal Asiatic Society possesses a pack of Hindustani C. which is said to be as old as the 9th c. M. Abel de Rémusat, an eminent Chinese scholar, affirms, on the authority of original MSS., that C. were known in China as early as 1122. It is not known precisely when they were introduced into Europe, and it is disputed whether Spain or Italy first knew their use. Probably it was Spain; but it is certain that they were brought to the Italian city of Viterbo in 1379, and that the game was known as *naib*—an Arabic word meaning a prophet, and suggesting that C. were used for fortune-telling, and that they were probably introduced to Europe by gipsies. From Italy they passed to Germany early in the 15th c., about the time of the invention of wood-engraving, an art at once applied to their production. Ulm became the centre of card-manufacture; and the Swabian C. had an immense circulation through Germany in the first half of the 15th c. C. were painted for the amusement of Charles VI. of France in 1393; and there are at present in the National Library of Paris seventeen of a pack which dates from about 1425. In France C. received an entire transformation. The game introduced to that country was the *tarot*—a word of uncertain derivation, but supposed to mean the 'royal road'—in which the C. bore emblematic figures mysteriously grouped, and were, it is supposed, employed rather for divination than amusement. The C. with which this mystic pastime was carried on are still extant in Switzerland and Germany, and in some parts of Alsace and Franche Comté. An entire *tarot* pack consists of seventy-eight C.—the *Fou*, like zero, with no value of its own, but increasing the value of any card combined with it; twenty-one *atouts*, of higher value than the rest, bearing emblems, the different combinations of which gave zest to the game; and fifty-six C., analogous to those at present in use; there being forty pip-C.—the ace to the ten in four suits—four each of kings, queens, knights, and valets. The pips were the vase, money, sword, baton, supposed to represent in order priest, merchant, warrior, husbandman. In France the number of the pack was reduced to fifty-two, as at present; the pips, *cœurs*, *carreaux*, *piques*, *trèfles*, or hearts, diamonds, spades, and clubs, were introduced, and the game of piquet was popular as early as the time of Charles VII. The game of C. now played is, accordingly, a French adaptation of the attempt at divination.

From France C. made their way into England some time prior to the year 1463, for in that year—the third of Edward IV.—*C. for playing* were among other articles prohibited from being imported, and that upon the petition of English manufacturers of them. The *Paston Letters* prove that C. were, as early as 1484, a familiar feature of the amusements at Christmas. In 1495-96 servants and apprentices were forbidden to play at C., except during Christmas holidays, and then only in their masters' houses. Henry was himself addicted to the pastime. James IV. of Scotland, in the year 1502, met his future spouse, Henry's daughter Margaret, at the card-table. James himself was fond of the game. Latimer's *Sermons on the C.*, preached at Cambridge in Christmas, imply the popularity of the game in the reign of Henry VIII. On October 22, 1629, a company was incorporated by letters-patent of Charles I., under the title of 'The Master, Wardens, and Commonalty of the Mystery of the Makers of Playing C. of the City of London.' The *bloudy game at C.* was frowned on under the Commonwealth, but became more popular than ever after the Restoration. Political, satirical, and fantastic C. became very common during the struggle between the House of Stuart and Parliament. One pack satirises the Rump Parliament, another is advertised, December 19, 1679, as containing 'An History of all the Popish Plots that have been in England;' and this kind of publication continued down to the time of George I., when the South Sea Bubble was the subject of a pack in England, and the Mississippi Scheme of one published in Holland. Then came into fashion logical, historical, geographical, and heraldic C. Innumerable attempts have been made to influence public opinion by modifications of the court-C. Thus, during the French Revolution, Molière, La Fontaine, Voltaire, and Rousseau were put in place of the kings of the four suits; while the queens were replaced by the cardinal virtues, Prudence, Temperance, Fortitude, and Justice. The Americans similarly have tried to substitute Washington, John Adams, Franklin and La Fayette for the kings, and for the queens Venus, Fortune, Ceres, and Minerva; while Indian chiefs are represented as knaves. Ingenious artists are constantly trying to introduce something more alive with meaning than the conventional king, queen, and knave, but they are not likely to succeed. Players care only for the game, and they know it best with the old familiar objects on the C.

The parliamentary regulations under which the card-trade is carried on in this country are contained in the Act 9 Geo. IV., c. 18. According to this Act, every maker of playing-C. has to pay an annual licence duty of 5s., the duty on every pack is 1s., and this is required to be specified on the ace of spades. In Great Britain C. are allowed only to be made in London; and in Ireland, Dublin and Cork are specified. Before a maker obtains licence, he must give a bond of £500 for the payment of duties; while selling or exposing for sale a pack of C. not duly stamped subjects a licensed maker to a penalty of £50, and any one else to £10. C., when exposed to sale, must be enclosed in wrappers with such marks as the Commissioner of Stamps may appoint. Second-hand C., without the wrapper of a licenced maker, may be sold by any person; but they must be sold in packs containing not more than fifty-two C., with an ace of spades duly stamped, and the wrapper enclosing them must have the words 'second-hand C.' in distinct characters. The penalty for neglecting these requirements is £20. See Taylor's *History of Playing-C.* (Lond. 1865), and Dr Willshire's *Catalogue Raisonné of the Cards in the British Museum* (1876).

Car'duus. See THISTLE.

Careen'ing (Lat. *carina*, 'a keel') a ship is the operation of heaving her down upon one side so that the other may be got at for cleaning from the *keel* up. It is now rarely practised, as mechanical apparatus has been invented to lift the ship out of the water.

Car'et (Lat. *careo*, 'I want'), the mark (∧) used when writing to call attention to the interlineation of something which has been omitted.

Carew', Thomas, first of the 'courtier-poets,' was born of a good family in Gloucestershire, about 1589, and educated at Corpus Christi, Oxford. After some time spent in foreign travel, C. was appointed gentleman of the privy chamber and sewer in ordinary to Charles I. He died in 1639. C. was the friend of Ben Jonson. His works are masques—the *Cœlum Brittanicum* is still remembered—lyrics (set to music by the brothers Lawes in the poet's lifetime), and sonnets, much in request between 1630 and 1640. C.'s verse is often flimsy enough, but graceful and tender. His poems were first published in 1640, again in 1772 by Davies, and in 1824 (at Edinburgh) by Maitland.

Car'ex, a genus of perennial plants belonging to the natural order *Cyperaceæ*. About 1000 species are known, scattered over the temperate and colder parts of the world. Mr Bentham allows forty-seven to be natives of Britain. They are sometimes called *sedges* or *seg*, and are grassy or rush-looking in appearance. Some of the species growing in sandy soil prevent the sand drifting, by binding it together with their long branching underground stems or sobols. *C. arenaria* is especially of value in this respect, and has been extensively planted on the dykes of Holland and in similar situations. The rhizomes of *C. hirta* and *C. disticha* are sometimes used as a diaphoretic and demulcent medicine under the name of *German Sarsaparilla*. See Dr Bott's great work on the genus.

Ca'rey, Henry C., an American political economist, was born at Philadelphia in December 1793. He is of Irish extraction, and was originally a publisher by profession. Among his chief works, all of which are popular, are his *Principles of Political Economy* (1837-40), from which Bastiat borrowed some of his leading ideas; his *Credit System in France, Great Britain, and the United States* (1838); his *Past, Present, and Future* (1848), in which he attacks Malthus and Ricardo; and his *Principles of Social Science* (1858). C., whose work on political economy has been abridged for the use of schools in America, is a protectionist, and an opponent of any international arrangement on the subject of copyright.

Carey, William, D.D., a well-known Baptist minister and missionary, was born at Paulerspury, Northamptonshire, 17th Au-

gust 1761. He was apprenticed to a shoemaker, but manifested from his early years a keen passion for knowledge, and acquired, almost without help, a knowledge of Greek, Latin, and Hebrew. He began to preach in his eighteenth year. A pamphlet (1789) of C.'s on foreign missions brought him into notice, and after the formation of the first foreign missionary society (by the Baptists), C. and Mr Thomas were sent to India as its agents in 1793. To C. more than to any other man belongs the honour of having founded the famous Serampore mission, which in 1832 had issued 200,000 Bibles, or parts of the Bible, in about forty native languages or dialects, besides a great number of other religious books and tracts. Much of the literary labour involved in these publications was performed by C., who was Professor of the Sanskrit, Bengali, and Mahratta Languages at Fort William College, Calcutta, from 1800 to 1830. Among C.'s other works were a Mahratta grammar and dictionary, a Sanskrit grammar, a Punjabi grammar, a Telinga grammar, a Bengali dictionary, and a Bhotanta dictionary. He died 9th June 1834.—His son, **Felix** (born 1786, died 1822), who accompanied him to India, published a grammar and dictionary of the Burmese language, and other works. See *The Life and Times of Carey, Marshman, and Ward, embracing the History of the Serampore Mission*, by John Clark Marshman (2 vols. Lond. 1859).

Carey'a, a genus of plants of the Myrtle order (section *Barringtoniæ*), mostly found in India, though one species is found in N. Australia. *C. sphærica*, of the Malayan Peninsula, has a tough bark fit for cordage. *C. arborea* is used for making boxes, hoops, &c.; but the timber splits up when exposed to the sun, and is pervious to rain. The drums of the Sepoys in India were formerly made of it. The bark is manufactured into cordage, and when prepared is used in some parts of India as a slow match for firelocks. In Scinde the fleshy calyx is said to be good for curing colds (Black).

Cargill'ia, a genus of plants of the Ebony order (*Ebonaceæ*). The Illawarra black plum (*C. australis*) yields a useful close-grained wood. The grey plum (*C. arborea*) also produces a similar wood, and fruits which are eaten by the natives. These, the only true species of the genus, are natives of tropical Australia.

Car'go (Span. *cargâr*, 'to load'), the goods, merchandise, or whatever is conveyed in a ship, with the exception of live animals and persons. The *deck-C.* is the portion of it carried on deck, and is not usually included in the policy of insurance. The *C.-book* records the names of the vessel, the owner, the shippers, and consignees, the ports of departure and destination, the time of departure, and other particulars for the inspection of the officers of the custom house.

Ca'ria, the ancient name of a country in the S.W. angle of Asia Minor, about the exact boundaries of which the ancient geographers are not agreed. Part of it was mountainous, but it contained much fertile land in the basin of the Mæander and its affluents. The inhabitants claimed to be autochthonous. Under Persian protection, the Carian princes established a kingly government, with Halicarnassus for their capital. About 129 B.C. the Romans annexed C. to their province of Asia. The chief towns of C., Miletus and Halicarnassus, were famous in antiquity.

Caria'co, a seaport of Venezuela, 40 miles W. of Cumana, on a small stream and gulf of the same name, with an export trade chiefly in cocoa and coffee. Pop. 7500.—**The Gulf of C.** extends 35 miles from E. to W., is nearly enclosed by a long narrow tongue of land, and affords capital anchorage.

Caria'ma (*Microdactylus*, or *C. cristatus*), a species of *Grallatorial* or Wading birds, presenting also strong affinities to the *Rasorial* or Gallinaceous birds, and inhabiting S. America, Guiana, Paraguay, and Brazil. The C. averages the common heron in size. Its plumage is brown, mottled and interspersed with black or dark brown, and running into white on the under parts. It feeds on snakes, worms, insects, &c.

Caribbe'an Sea, an immense American inlet of the Atlantic Ocean to the N. of Venezuela, is bounded on the W. by Guatemala and Yucatan, and encircled on the N. and E. by the chain of the Greater and Lesser Antilles. It extends in about lat. 8°-22° N., and in long. 61°-89° W., and its principal gulfs are those of Honduras, Darien, and Maracaybo. The name of this sea, as also of the C. Islands (see ANTILLES), is derived from the *Caribs* or *Galibi*, a native American race, now all but extinct, which occupied the entire N. coast of the S. American continent, and also the W. Indies, at the discovery of America.

Carib'ee, Caribbean, or Piton Bark, the bark of *Exostemma floribundum* or *Caribæum*, a small tree of the W. Indies and Mexico, belonging to the natural order *Cinchonaceæ*. In the W. Indies it is known as the *Seaside Beech*. It is closely allied to *Cinchona*, and though it contains none of the alkaloids which give the value to that bark, yet in some respects it resembles it in properties, and is occasionally substituted for it.

Car'ica. See PAPUA.

Caricature' (Ital. *caricatura*, from *caricare*, to 'overcharge or exaggerate'), a representation in design or description in which the salient features of the subject are exaggerated, and point is thus given to the general likeness. The object of C. is to realise the ludicrous, and in effecting this object idealisation is ignored and harmony scorned. C. is thus a degenerate form of art. When, however, it is made the vehicle of satire, and thus abandons its usual function (to amuse), and rises to a higher one (to teach), it must be regarded as a worthy and honourable form of artistic expression. The arrows of Hogarth's satire are winged with C. C. is one of the oldest forms of art. Ancient Egyptian art is usually grave and sombre, yet it furnishes numerous specimens of C., while in the arts of Greece and Rome it has an important place. During the middle ages it flourished in every European nation, and in these, monks and priests were frequently chosen as its subjects. In contemporary British art the best examples of C. are to be found in the pages of *Punch* and *Vanity Fair*. See Wright's *History of C. and Grotesque* (Lond. 1865), and his C. Histories of the Georges (1868) and of Napoleon III. (1871).

Ca'ries (Lat. 'rottenness') is a term somewhat vaguely applied to any kind of ulcer in bone. C. proper, however, is an ulceration characterised by having fine needle-like pieces of bone in it, mixed up with marrow and weak flabby granulations. A probe passed into the ulcer sinks deep into the soft spongy bone. The portion of bone next to the ulcer is expanded by the opening out of its texture. The ulcer is uneven, being deeper in one part than another. C. may be simple or the result of a scrofulous constitution. It may be caused by an ulcer spreading to a bone from the soft tissues or from cartilages, or by excessive syphilis or mercury. It may occur in any bone, but most frequently shows itself in short or irregular bones as the Vertebræ (q. v.), the bones of the ankle, foot, wrist, or hand. In a long bone it generally appears near the articular end. C. in the vertebræ causes great deformity, producing curvature of the spine and humped back. It is always accompanied by more or less weakness of the general health. The proper treatment of C. consists in giving nourishing food, tonics, cod-liver oil, syrup of the iodide of iron. Injections of solution of chloride of zinc or the dilute mineral acids are often beneficial. In joints, excision is often practised with good results. Sometimes the diseased portion is removed by a gouge, or the whole bone may be removed when practicable.

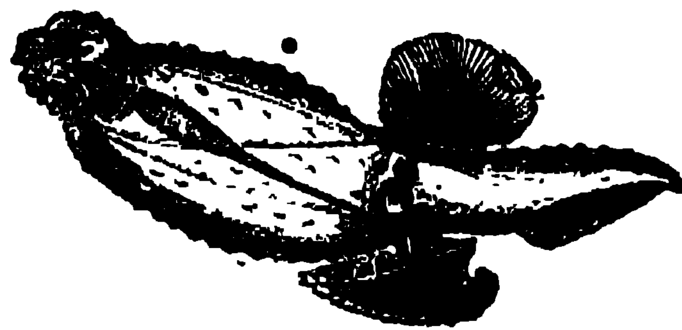
Caries of the Teeth is the term used to denote decay of that portion of a Tooth (q. v.) called the *dentine*. It may commence on the surface of the tooth or beneath the enamel. In its early stage the diseased parts may be scooped out, and the tooth stuffed with gold or cement; but when the pulp cavity of the tooth is exposed by C., extraction of the tooth is the proper remedy. See TOOTHACHE.

Caries, in plants, consists in the decay of the walls of the cells or vessels, and though not caused by fungi, is yet promoted by their presence.

Carigna'no, a walled town in the province of Turin, N. Italy, on the left bank of the Po, 11 miles S. of Turin, with silk manufactories, and a pop. of 4824. The district is fertile, but the atmosphere is very humid.

Carima'ta, an island, group of islands, and strait, to the S.W. of Borneo, between it and Billiton. The single island, which is much the largest of the group, is about 10 miles long and 5 broad, and attains a height of over 2000 feet.

Carinar'ia, a genus of aberrant *Gasteropodous* mollusca, included in the section *Heteropoda* or *Nucleobranchiata* of that class, and in the family *Firolidæ*. The gills are borne on the back, and are protected by a small univalve shell. The animal swims back downwards, by aid of a ventral fin-like organ, consisting of the modified 'foot;' whilst it may adhere to seaweed, &c., by a sucker-like disc borne on the foot. These animals occur as free-swimming organisms, chiefly in the tropical seas. *C. cymbium* is the familiar species.


Carinaria.

Car'inate Birds, or **Carinatæ**, is Huxley's name for one of the three great divisions into which he divides the class *Aves* or Birds. The *C. B.* include by far the vast majority of birds, distinguished by the fact that the breastbone or sternum possesses a prominent ridge or 'keel' (*Carina*). The ostriches, and other *Cursores* having flat or raft-like sterna, are named *Ratitæ*; whilst Huxley's third division, *Saururæ*, includes but a single bird, the extinct *Archæopteryx* (q. v.).

Cari'ni, an old town in the province of Sicily, S. Italy, 12 miles W.N.W. of Palermo, has a ruined castle, and some fishing and coasting trade. Pop. 9000.

Carino'la, a town in the province of Caserta, S. Italy, lies in a rich wine district, 20 miles S.E. of Gaeta. Its chief buildings are a cathedral and a convent of the Franciscan order. Pop. 6620.

Carinth'ia (Ger. *Karnten* or *Kärnthen*), a duchy and crown-land in the S.W. of the Austro-Hungarian Empire. Area, 4005 sq. miles; pop. (1869) 337,694. It is in great part mountainous, and is traversed from W. to E. by the Drave, with its tributaries the Möl, Lavant, Gail, and Gurk. The plains and valleys are well cultivated, and there is a large number of the inhabitants engaged in the rearing of horses, cattle, sheep, goats, and swine. There are also active manufactures of iron and steel wares, chiefly in Klagenfurt (the capital) and Villach. The export trade has been greatly promoted of late years by the Carinthian Railway. The Government has its largest lead-mines in the Villach Alps, where is found the finest mineral in Europe. C. is named from its earliest known inhabitants, the Celtic *Carni*, who in turn were so called from the horns or crags (Celtic, *carn*; comp. Lat. *cornu*, Eng. *horn*) of the rugged region. C. was under Noricum till the time of Augustus, who made it part of the Roman Empire. Soon after the fall of the Western Roman Empire the country was occupied by Slaves, who later required the service of a Frank called Samo to repel the encroachments of the Avari. Samo formed the extensive Slavic kingdom of Carantania, which after his death was annexed by Charlemagne, who made it a markgrafdom of the Frankish Empire. It was raised to a duchy in the 10th c., became part of Austria in 1335, and a crown-land in 1849. See Ankershofen, *Geschichte des Herzogthums Kärnten* (2 vols. Klagenf. 1857–59).

Cari'pe, a town of Venezuela, S. America, 50 miles E. of Cumana. Pop. about 5000. Humboldt, in his *Personal Narrative*, describes a vast cavern in the neighbourhood of C. which is frequented by countless numbers of the Guacharo (q. v.), a bird peculiar to S. America.

Cariss'a, a genus of Apocynaceous plants, consisting of shrubs with milky juice, natives of Asia and tropical Australia. *C. Carandas* of India is employed for fencing; the fruits are also eaten as a conserve. The bark and wood (*Bois amere*) of C. *Xylopicron* of the Mauritius and Bourbon are used by the natives in diseases of the urinary organs. Cups are made of its wood, in which water is allowed to stand until it gets bitter, as in the 'bitter cups' of quassia in this country (Masters).

Car'jacou, or **Car'iacou** (*Cariacus Virginianus*), a species of *Cervidæ* or deer inhabiting N. America, and sometimes known as the 'Virginian deer.' The horns of the adult males are bent backwards, and then sharply turned forwards, so as to bring the tips above the nose, or nearly so. 'Snags' or branches are given off, one at the inner side of the base of each horn, and several on the posterior edge. The colour of the animal is reddish-brown in spring, bluish in autumn, and brown in winter. The belly, throat, chin, and inner aspects of the limbs are white. The adult is about 5 feet in length. The C. is easily domesticated if taken young.

Car'len, Emilié, a Swedish novelist, the youngest of a family of fourteen, was born at Stromstad, 8th August 1807. Her maiden name was Schmidt. She was married in 1827 to a physician called Flygare, who died in 1833, and again in 1841 to J. Gabriel Carlen, author and lawyer. Her first literary effort was *Waldemar Klein* (1838), since which time she has poured forth a constant stream of novels, many of which have been translated into English. The principal are *Ivar, or the Skjuts Boy*; *Woman's Life*; *John, a Novel*; *The Hermit*; *Marie Louise*; *Julie, or Love and Duty*; *Gustaf Lindorm, the Guardian*. They deal chiefly with humble life, and are very popular.

Carle'ton, William, an Irish novelist, was born in 1798, at Prillisk, Tyrone. After a youth of poverty he betook himself to Dublin, where, in 1830, he published his *Traits and Stories of the Irish Peasantry* (5th ed. 1864). It was well received, as was also a second series. C. has produced various humorous and pathetic tales, among others *Fardorougha the Miser* (Dub. 1839); *Rody the Rover* (Dub. 1846); *The Black Prophet, a Tale of Irish Famine* (Dub. 1847); *The Tithe Proctor* (Dub. 1849); *Willy Reilly* (Dub. 1855); *The Evil Eye* (Dub. 1860). They give faithful, touching pictures of the life of the Irish peasantry—the class to which C. belonged. He died January 30, 1869.

Car'li, Giovanni Rinaldo, Count, an Italian archæologist, sometimes called **C. Rubbi**, after his wife, was born at Capo d'Istria, 11th April 1720, and studied at the University of Padua. In 1741 he was appointed Professor of Navigation and Astronomy by the Senate of Venice, but resigned his professorship in 1749, and retired to Istria. In 1771 he was made President of the Council of Commerce and Finance at Milan, where he died, 22d February 1795. A collected edition of his works was published at Milan (1784–94) in 18 vols. They embrace a wide range of subjects in literature, science, and economics. Among the most noteworthy are his treatises, *Delle Monete e dell' Istituzione delle Zecche d'Italia* (3 vols. 1754–60), and his *Delle Antichità Italiche* (5 vols. Mil. 1788–91).

Car'line Thistle (*Carlina*), a genus of plants of the natural order *Compositæ*. The legend attached to it is that an angel appeared to the Emperor Charlemagne pointing out the C. T. as a remedy for the plague, hence the name. Linnæus, however, ascribes the name to the Emperor Karl V., whose army was relieved in Barbary of the plague by the same remedy. *C. acaulis* grows over the middle of Europe, and is in great repute as possessing in its roots drastic purgative qualities: its use is now almost confined to veterinary practice. *C. vulgaris* is the only British species: it grows on poor soils. *C. gummifera* and other species contain a resin in which the active properties are believed to reside.

Car'ling, Carle, or **Care Sunday**, the fifth Sunday in Lent, on which carlings, or parched peas, used formerly to be eaten.

Carlings, in shipbuilding, are short beams laid fore and aft with their ends secured into the great transverse beams. They help to support the deck, and to bind together the principal beams.

Carlisle', a city in the N. of Cumberland, at the confluence of the Eden, Caldew, and Peteril, 12 miles E. of the Solway Firth, 60 W. of Newcastle, and 105 N.N.W. of Manchester. It lies in a beautiful and fertile district, is steadily extending, and has several fine streets, diverging from the large market-place as a centre. Its principal modern buildings are the court-houses and county gaol, the Cumberland infirmary, enlarged in 1874, the post-office, the Citadel railway station, and the local banks. In front of the court-houses stands a white marble statue of William Earl of Lonsdale, and in the market-place is another, erected in honour of Mr James Steel, a distinguished local journalist. The railway station is the terminus of no fewer than eight lines. C. Castle, in which Queen Mary Stuart was imprisoned in 1568, is still used as barracks. C. has been the see of a bishop since 1101, and four canons are attached to its celebrated cathedral, which is a small red-freestone building, partly of Norman and partly of Early English architecture, and reputed to have the finest

east window in England, consisting of nine richly-coloured lights. It was founded by William Rufus, and dedicated by Henry I. in 1101. C. has manufactures of cotton, woollens, linen, leather, iron, and hardware. It has also valuable salmon-fisheries. Silloth (q. v.) is its port. It returns two members to Parliament. Pop. (1871) 31,049. C. was probably a British town before the Roman invasion, and is thought to be the site of the Roman station *Lugovallum*. But it first becomes historical in the poems of the Welsh bards, where it appears as *Caer Lliwellydd*, of which the modern name is a corruption. It was the residence of the British Kings of Cumbria, and was sacked by the Angles of Northumbria about 680. In the 11th c. it began to emerge from obscurity, and subsequently, till the union of England and Scotland, it continued, as a fortress, to play a conspicuous part in Border history. In 1745 it readily surrendered to Prince Charles Stuart, but it was recaptured by the Duke of Cumberland, who summarily executed many of the citizens. In the vicinity of C. have been found many Roman antiquities, mainly coins, altars, and brass vases.

Carlisle, a flourishing town of Pennsylvania, 125 miles W. of Philadelphia, and 18 S.W. of Harrisburg by railway. It lies in the Great Limestone Valley, between the Kittatinny and South Mountains, is the seat of a Methodist College (Dickinson's), and has increasing manufactures, chiefly of machinery. Pop. (1870) 6650.

Carlisle, Frederick Howard, Earl of, was born 28th May 1748, and succeeded to the earldom at the age of ten. His mother, Isabella Byron, was a sister of the famous admiral and navigator. C. was educated at Eton and Oxford. In 1780 he was appointed Viceroy of Ireland, and was for a time an opponent of Pitt in Parliament, but changed his politics after the outbreak of the French Revolution. He died 4th September 1825. C. was an able politician, but is best known by his contributions to literature, which were published in a collective form in 1801 under the title of *Tragedies and Poems*, and gave occasion to a recklessly bitter note in Byron's *English Bards and Scotch Reviewers*.—**George William Frederick Howard**, Earl of C., son of the preceding, was born April 18, 1802, and educated at Eton and Oxford, where he won the Chancellor and Newdegate prizes for Latin and English verse. C. entered Parliament as a Liberal, sitting first for Morpeth, and subsequently for the West Riding of Yorkshire. Under the administrations of Lord Melbourne, Lord John Russell, and Lord Palmerston, he held various offices, including those of Chief Secretary for Ireland, Chief Commissioner of Woods and Forests, Chancellor of the Duchy of Lancaster, and Lord-Lieutenant of Ireland. He died 5th December 1864. He was a man of literary taste and culture. Besides delivering lectures on America and on the writings of Pope, &c., he wrote a *Diary in Turkish and Greek Waters* (1854), and a book on Prophecy.

Car'lo Alber'to Amede'o, King of Sardinia, born 2d October 1798, a son of Prince Carlo Emanuele of Savoy-Carignan, who died in 1800. C., connected through his mother with the house of Saxony, married in 1817 Maria Theresa, daughter of Ferdinand of Tuscany, and on the Piedmontese revolution of 1821, became for a short time Regent of Sardinia, introducing a constitutional government, which was repudiated by Carlo Felice, the successor of Vittorio Emanuele on the throne. After acting for two years as Viceroy of Sardinia, C. succeeded, his title having been previously recognised by the Congress of Vienna. At first, Austrian influence and the fear of Carbonarism, thwarted the essentially Liberal intentions of the new King, but after the accession of Pio Nono, the army was nationalised, the press laws modified, and, when the year of revolutions came, C. was able to assist Lombardy against the Austrians with a large and enthusiastic army. The superior numbers under Radetzky were victorious at Villafranca, Milan, and Novara (1849), and C., abdicating in favour of his son, Vittorio Emanuele II., retired to Oporto, where he died, 28th July 1849. C. patronised the fine arts.

Carlo Emanue'le I., called 'the Great,' Duke of Savoy, born at Rivoli, 12th January 1562, succeeded his father, Filiberto Emanuele (Iron-head), and married in 1585 Catherine, the youngest daughter of Philip of Spain. His favourite policy was to gain a footing in Provence and Sáluzzo by playing the part of a Catholic liberator; he even laid claim to the French crown on the death of Henri III., whose cousin he was; but in 1597 the Protestant leaders, Lesdiguières and La Valette, forced him to withdraw from Provence. Compelled in 1601 to give up several districts in the department of Ain, and unsuccessful in his attacks on Geneva, C. at last became the ally of France, and for several years was in the field against the Spanish power in N. Italy, where he obtained the territory of Montferrat. C. was put forward by the Protestant Union as a candidate for the empire at the death of Matthias. The league against the action of Spain against the Protestants of Valtellina, a war with Geneva about the territory of Zuccarello, and the invasion by Louis XIII. of Savoy and Piedmont, fill up the rest of C.'s life. He died at Savillan, 26th July 1630, leaving a military reputation which was not founded on military success.

Car'los, Don, Infante of Spain, born July 8, 1545, at Valladolid, was the son of Philip II. by his first wife, Maria of Portugal. Originally declared the King's heir, he was afterwards passed over for his cousin Rudolfo, and in consequence is supposed to have entered into a plot against the King and his favourite, the Duke of Alva. At all events, on the declaration of a priest who divulged what had been said in confession (Christmas Eve, 1567), he was found guilty of conspiring against the King's life, and imprisoned. He died July 24, 1568. It was suspected at the time that he had been poisoned or strangled, but of this there is no proof. His fate has been made the subject of dramas by Montalvan (Spanish), Alfieri (Italian), Schiller (German), and Russell (English). See Prescott's *History of the Reign of Philip the Second* (Bost. 1856), and Gachard's *Don C. et Philippe II.* (Bruss 1863), which contains a complete collection of the original documents.

Carlos de Bourbon, Don Maria Isidor, born March 29, 1788, was the second son of Charles IV. of Spain, and brother of Ferdinand VII., who obtained the Spanish throne after the expulsion of the French. He is solely notable for his attempts to gain the throne, his pretensions to which were blasted by the birth of a daughter (the late Queen Isabella) to Ferdinand, and the abrogation of the Salique law, excluding females from the throne. After Ferdinand's death, his claims, although supported by Dom Miguel in Portugal, were not acknowledged by the European powers, and, after he had made an attempt to excite an insurrection, were rejected by the constituent Cortes. In 1844 he abdicated in favour of Don C., his eldest son, and went to live at Trieste, where he died, March 10, 1855.—**Don Carlos**, the younger, better known as the Count de Montemolin, born January 31, 1818, endeavoured, but also in vain, to obtain the throne, and, in 1860, being arrested in France, signed a renunciation of his claims. He died January 14, 1861.—The third Carlist pretender, also calling himself **Don Carlos**, is the nephew of the Count de Montemolin, being the son of his brother Juan, and was born in 1848. After the revolution which expelled Queen Isabella in 1868, Carlist risings took place in various parts of Spain, and from 1871 to 1875 Don C. was established in the Basque Provinces. His troops inflicted several defeats upon the forces, Republican and Alphonsist, opposed to them, but were subsequently completely crushed. The surrender of Estella (February 1876) compelled Don C. to flee into France, and the miserable struggle is now over, at least for a time.

Carlos, San, a town of Venezuela, S. America, on the Aguare, a tributary of the Apure, about 70 miles S.S.E. of Valencia. The rearing of cattle and the cultivation of indigo, cotton, and coffee are the principal industries. The prosperity of this town was seriously damaged by the wars of independence; but it has more than recovered its former wealth and importance. Pop. (1873) 10,420.

Car'lovicz, or **Kar'lovitz**, a town in the military frontier of the Servian Banat, Austrian Empire, on the right bank of the Danube, 8 miles S.S.E. of Peterwardein. It is the seat of the patriarch and metropolitan of the 'non-united Greeks,' has a theological school belonging to that sect, and a gymnasium. Pop. (1869) 4419. From the vineyards on the mountains in the vicinity is obtained a large supply of a strong red wine which is classed with the choicest vintages of Hungary. At C. was concluded, 26th January 1699, a treaty of peace between Turkey and the Allies, Germany, Russia, Poland, and Venice, by which

Hungary was finally secured to Austria. In 1848-49, C. was the centre of the Servian revolt against the leadership and domination of Hungary.

Carlovingian or **Carolingian Dynasty**, a Latinised spelling of the name of the second German dynasty that ruled in France. See KAROLINGS.

Car'low, an inland county of Ireland, province of Leinster; area, 346 sq. miles; pop. (1871) 51,650, being a decrease of 5487 since 1861. It is triangular in shape, with the vertex towards the S., and is hilly on its E. and W. borders, but the greater part is level and fertile. The chief rivers are the Slaney and the Barrow. In 1873 there were 79,416 acres under grain crops; potatoes and turnips were largely cultivated; and about a third was in meadow and clover. There are many flour-mills along the Barrow, and malting and distilling are important industries. Flour, oatmeal, and dairy produce are exported, and a good deal of bacon is cured for the home market. C. returns two county members to Parliament. There are cromlechs near C. and Hacketstown on the Dereen.

Carlow, the capital of the county of C., on the left bank of the Barrow, where it is joined by the Burren, 56 miles S.W. of Dublin by rail. The Irish form of the name is *Cetherloch*, pronounced *Caherlough* ('quadruple lake'), there being a tradition that the Barrow here at one time formed four lakes; and early English writers spell it *Catherlogh*. C. consists mainly of two streets, and the suburb of Graigue in Queen's County. It has a Roman Catholic cathedral, and a college for the education of Roman Catholics, founded in 1789, and enlarged in 1828. There are large grinding-mills both on the Barrow and the Burren, and an extensive trade is carried on in butter and agricultural produce. The castle, founded by the De Lacys about the close of the 12th c., remained in an almost complete state till 1814, when an attempt was made to reduce the thickness of the walls and to enlarge the windows by gunpowder, and the greater part was destroyed. Pop. of C. proper (1871), 6526; of portion in Queen's County, 1316; total, 7842. The town returns one member to Parliament.

Carlsbad. See KAISER-KARLSBAD.

Carlscrona. See KARLSKRONA.

Carlshamm. See KARLSHAMM.

Carlsruhe. See KARLSRUHE.

Carlstad. See KARLSTAD.

Carlstadt. See KARLSTADT.

Carludovi'ca, a genus of plants of the natural order *Pandanaceæ*. The young unexpanded leaves of *C. palmata* furnish the material out of which Panama hats are made. One of these hats sometimes takes three months to make, and costs as much as £30.

Carluke', a burgh in the upper ward of Lanarkshire, near the right bank of the Clyde, 19¼ miles E. by S. from Glasgow, and a station on the Caledonian Railway. The district is rich in iron and coal. About a mile from the town are the large works of the Shotts Iron Company. C. is the birthplace of General Roy, the famous military antiquary. Pop. (1871) 3423. Many Roman relics have been found in the vicinity.

Car'lyle, Alexander, D.D. (born January 26, 1722; died August 25, 1805), for fifty-seven years minister of the parish of Inveresk (Musselburgh), is chiefly known as the contemporary and friend of Hume, Home, and Robertson, and as one of the leaders of the Moderate party in the Church of Scotland. He was a man of singularly fine presence, being popularly known as *Jupiter C.*, and described by Sir Walter Scott as 'the grandest demigod I ever saw.' His autobiography, containing *Memorials of the Men and Events of his Time*, was published in 1860 under the editorship of Mr (now Dr) John Hill Burton. It is admitted to be one of the best books of the autobiographical kind, and its shrewd, lively sketches of the men and manners of the period in which he lived are invaluable for historical purposes.

Carlyle, Thomas, the 'censor of the age,' and one of the greatest forces in British literature, was the eldest son of a shrewd Scotsman, mason and farmer, of Ecclefechan village ('Entepfuhl'), in Hoddam parish, Dumfriesshire. There, in the Arched House, C. was born, December 4, 1795. After receiving instruction at the old parish school and the burgh school of Annan, C. proceeded in 1810 to the University of Edinburgh, with the intention, afterwards abandoned, of studying for the ministry of the Scotch Church. He applied himself to classics, and still more to mathematics and general literature, with such energy that he injured his very robust health. After finishing the Arts curriculum, he was appointed mathematical teacher in the burgh school of Annan, a post which he held for two years, when he obtained a similar situation in the burgh school of Kirkcaldy. His stay there is chiefly notable for his making the intimate acquaintance of Edward Irving, another Annan schoolboy, and then master of an adventure school in Kirkcaldy. In the end of 1818, C. left Kirkcaldy for Edinburgh, where he read hard for three years, and contributed articles to Brewster's *Edinburgh Encyclopædia*. In 1821 C. became tutor to Charles Buller. In 1823 he sent to the *London Magazine* the first part of his *Life of Schiller*; and in 1824 produced a translation of two very dissimilar works, Legendre's *Astronomy* and Goethe's *Wilhelm Meister*, the latter of which was severely treated by several critics, including De Quincey and Jeffrey. Next year his *Schiller* appeared in a complete form. For some time afterwards, C. occupied himself with translating German romances. In 1826 he married Miss Jane Welsh, a lineal descendant of John Knox, and two years later retired to the farm of Craigenputtoch, his wife's property, about 15 miles N.W. of Dumfries, and described by him in a letter to Goethe as the 'loneliest nook in Britain.' There he contributed to various reviews that celebrated series of articles subsequently republished under the title of *Miscellanies*, on French, and still more on German, authors, such as Goethe, Novalis, Heyne, Schiller, Werner, and Richter (which may be said to have opened for most Englishmen the treasury of German literature); and there he also produced his first great and purely original work, *Sartor Resartus*, which, after being rejected by several London publishers, appeared, in 1833-34, in *Fraser's Magazine*. He had removed to No. 5, Cheyne Row, Chelsea, before this date; henceforth his reputation was established, and since has steadily grown. Of later works the chief were *The French Revolution* (1837); *Chartism* (1839), *Past and Present* (1843), and *Latter-Day Pamphlets* (1850), assailing in terms of unmeasured contempt the corruptions, as he deems them, of British society and politics; *Oliver Cromwell's Letters and Speeches* (1845), the work that first won for him the admiration and confidence of the entire English public, and in which his extraordinary power of taking trouble with a subject was first brought home to the English mind; *Life of John Sterling* (1851); *History of Friedrich II. of Prussia, called Frederick the Great* (1858-65), in which the qualities visible in his *Cromwell* once more appear, but in a far more striking and powerful way; and, in 1875, *Early Kings of Norway*, with *Portraits of John Knox*, which had previously appeared in *Fraser's Magazine*. Several editions of his works have been published, of which that by Chapman & Hall (34 vols.) is the latest and best. Between 1837 and 1840, C. also delivered in London four series of lectures on German literature, on the history of literature, on the revolutions of modern Europe, and on heroes and hero-worship, which made a powerful sensation at the time they were delivered. According to Leigh Hunt, 'it was as if some Puritan had come to life again, liberalised by German philosophy and his own intense reflections and experience.' In the session of 1865-66, C. was elected Lord Rector of Edinburgh University by the students, and on April 2d of the latter year delivered a characteristic installation address. Within three weeks he had lost the loving helpmate of forty years, and thenceforth he wrote little, albeit too much. He died at Chelsea, February 5, 1881, and was buried at Ecclefechan. Of the value of C.'s opinions on life, society, and politics it is not yet time to speak. Whatever may be the final verdict of history, one thing will always be gratefully allowed, that he breathed into literature a nobler, purer, and sterner spirit than ever animated it before. The moral influence of his writings has been incalculably great, and will continue to operate beneficially long after other thoughts than C.'s have acquired dominion over the mind of the nation. Nor can we easily imagine an age so far sunk in triviality and impotence that it will be indifferent to the picturesque creations of an imagination unsurpassed in this century, or to a humour which combines the riot of Rabelais with the grimness of Knox. See his *Reminiscences* (2 vols. 1881), 'edited' by Mr. Froude, who is also preparing his Biography.

JOHN AITKEN C., M.D., LL.D., a younger brother of Thomas

C., was born at Ecclefechan, July 7, 1801. He is known chiefly as the author of a very fine translation of Dante's *Inferno* (1849). A contributor also to magazines, he died at Dumfries, September 15, 1879.

Carmagno'la, a town in the province of Turin, N. Italy, near the Po, 15 miles S. by E. of Turin. It has an active trade in silk, flax, hemp, corn, and cattle, and manufactures of jewellery. Pop. 12,519. C. is the birthplace of the famous Venetian general, Francesco Bussone.

Car'magnole, a notorious song during the French Revolution, which was accompanied by a dance to the refrain :—

'Dansons la Carmagnole ;
Vive le son
Du canon !'

It was named after the town Carmagnola, in Piedmont, because Savoyard boys frequently went about with it. The word was also applied to a kind of jacket, the wearing of which was considered patriotic, and to the high-flown reports about the achievements of the French army which were issued.

Car'mel (Heb. 'a garden'). 1. A mountain ridge in Palestine, which branches off from the N. end of the mountains of Samaria, runs N.W. between the plains of Sharon and of Esdraelon, and the N.W. extremity of which projects far into the sea, forming a bold promontory, the only one along the whole coast of Palestine. Its length is about 16 miles, and its highest point 1750 feet above the sea. 2. A town in the mountains of Judah, the residence of Nabal (1 Sam. xxv.).

Carmel, Knights of Mount, an order of knights, consisting of a hundred French gentlemen, each of whom could prove at least four descents of nobility by both father and mother. It was instituted by Henri, King of France and Navarre, was confirmed by a bull of Pope Paul V. in 1607, and was incorporated with the order of the Knights of St Lazarus of Jerusalem. The specialty of the Knights of Mount C. was personal attendance on the king during war.

Car'melites, an order of monks, founded on Mount Carmel by Berthold, Count of Limoges, about 1156. They were driven from the place of their institution by the Saracens, and became a mendicant order in 1247, when Simon Stoch was their general. They were subsequently divided into several branches, one of which is the barefooted C. The order of C. nuns was instituted in 1452. Both still exist in Roman Catholic countries.

Carmin'atives are medicines that remove flatulency. They are so called because they were supposed to act like a charm (*carmen*). All warm and stimulating aromatics are C.

Car'mine, a very beautiful brilliant scarlet colour, consisting of carminic acid, the colouring matter contained in the cochineal insect (*Coccus cacti*). C. is soluble in water, and is of great value as a painter's colour, chiefly for miniature painting and as a water-colour. It is also employed in the dyeing of wool when a brighter colour than can be produced even by aniline dyes is desired. C. is ordinarily prepared by boiling cochineal with carbonate of potash, to which after boiling a proportion of alum is added. In a short time the remains of the cochineal fall to the bottom, and the clear liquid is again put over the fire with a proportion of isinglass dissolved in a large quantity of water. The vessel is removed from the fire at the point of boiling and briskly stirred, after which the C. begins to deposit, which it does completely in about twenty minutes. When drained and dried it is ready for use. C.-lake is a compound of C. and alumina, and is the form in which the colour is chiefly used for water-colours. Madder-C. is a scarlet lake prepared from madder root. The rouge which is used on the stage and elsewhere ought to owe its tint to C.

Car'möe, or **Kar'moe**, an island on the W. coast of Norway, at the entrance of the Bukke Fiord, 20 miles N.W. of Stavanger. It is 21 miles long and 5 broad, and has about 6400 inhabitants, chiefly engaged in fishing and in cattle-rearing.

Carmo'na, a town of Spain, province of Seville, on a mountain ridge overlooking a fertile, olive-clad plain, about 20 miles N.E. of Seville. The oriental walls and castle, with the old Gothic church, give it a most picturesque appearance : the gate leading to Cordova is particularly striking. Pop. (1860) 15,121.

Car'nac, a small village in the department of Morbihan, France, on a height near the sea, 16 miles W.S.W. of Vannes. Pop. of commune (1872) 2823; of village, 603. It is celebrated for its Celtic remains, some 4500 inverted granite obelisks, varying in height from 3 to 18 feet, and disposed in eleven parallel rows. The origin and purpose of these remains is uncertain.

Carnahu'ba, Carnäuba, or **Caranaiba Palm** (*Copernicia* or *Corypha cerifera*), a fine species of palm, a native of the northern parts of Brazil, where it exists in great forests. Wax forms on the under surface of the leaves, and can be collected by shaking them. It is used in the manufacture of candles. It has been imported into Britain, under the name of Carnaiba or Brazilian wax.

Carnar'ia, Cuvier's name given to an order of mammalia including the *Feræ* or beasts of prey of Linnæus (excepting the *Marsupials* or pouched mammals), and also the *Cheiroptera* or bats, which Linnæus placed with man and monkeys in his order *Primates*. Cuvier's division thus included the modern orders *Carnivora*, *Insectivora*, and *Cheiroptera*, and the characters of these groups were derived from the nails or claws of the toes, the absence of opposable thumbs, and the presence of the three kinds of teeth ; the dentition, however, varying according to the nature of the food.

Carnar'von, Henry Howard Molyneux Herbert, Earl of, eldest son of the third Earl of C., who had a reputation both as a scholar and a poet, was born in London, June 24, 1831. Educated at Eton and Christ Church, Oxford, where he graduated in 1852 as a first-class in classics, C. (who represents a younger branch of the Pembroke family) succeeded to the title in his minority. He entered the House of Lords as a Conservative, was complimented on his first speech by Lord Derby, and in 1858 became Under-Secretary for the Colonies, in which post he showed considerable business ability. Retiring from office with his party, he travelled in the East, and in 1860 published a work on *The Druses of Mount Lebanon*. He joined Lord Derby's third administration in 1866 as Colonial Secretary, and as such prepared the plan for the confederation of the British N. American colonies, which has had such good results. He resigned, however, on account of a difference of opinion from his leading colleagues on the subject of parliamentary reform in 1867, but joined, in his former capacity, Mr Disraeli's second administration in the beginning of 1874. His second occupancy of this office has been marked by the annexation of the Fiji Islands to the British Empire, and the preparation of an elaborate scheme for the confederation of the British colonies in S. Africa. No English statesman enjoys a greater measure of public confidence and goodwill.

Carnat'ic (properly *Carnâtaka*, or Carnata, *i.e.*, blackland), the former name of the S. part of the Indian peninsula, extending from Cape Comorin to the river Kistna, and lying between the Coromandel and Malabar coasts.

Carna'tion, one of the finest of garden flowers, a variety of *Dianthus Caryophyllus*, the clove pink. It has long been a favourite plant, and is now found in numerous varieties, such as *Flake C.*, *Bizarre C.*, *Picotees*, *&c*. The Spanish C. is *Poinciana pulcherrima*.

Carnations (Lat. *caro*, 'flesh'), in painting, are the parts of a picture in which the nude form appears, and in which the texture and glow of the body is sought to be realised by flesh-tints. Among the old masters the practice of painting from the nude was more general than in later times, and the C. of the works of the great colourists of the Venetian school are consequently more brilliant and truthful than those of modern artists.

Carne'ades, a Greek philosopher, born at Cyrene, B.C. 213, was the pupil of Diogenes the Stoic, and of Hegesippus the Academic, to whose chair he succeeded. After his embassy to Rome, B.C. 155, where his sceptical theory of justice provoked the anger of Cato the Censor, he taught the new academy at Athens, where he died at the age of ninety. As his predecessor Arcesilaus had opposed Zeno, so C. opposed to the stoic Chrysippus the doctrine of the acatelepsy, or incomprehensibility of

all things in themselves. This meant that perception cannot be shown to resemble the object perceived in either primary or secondary qualities, but is only related to it as its effect upon the nervous system of man. From this C. rashly inferred the uncertainty of human knowledge, practical certainty being dependent on uniformities of co-existence and succession, not on metaphysical resemblances (Ritter & Preller, *Hist. Phil.*). C. is called by Cicero 'acerrimus et copiosissimus.'

Carne'lian (Lat. *caro*, 'flesh'), a variety of chalcedony, semi-transparent, coloured red, brown, or yellow by oxide of iron, and sometimes white. The rich Oriental variety is called Sard (q. v.). C. is an abundant mineral, and is formed into seals, brooches, and other personal ornaments.

Carnio'la (Ger. *Krain*), a crown-land of the Austrian Empire: area, 3860 sq. miles; pop. (1869) 466,334. The surface is rugged and mountainous, the Carnic Alps, with their ramifications, occupying that portion N. of the Save, and the Julian or Krainer Alps the central and southern parts. The highest point is the Terglow, 9397 feet, on which is the solitary glacier of C. The Save is the principal river. The chief productions of the soil are rye, barley, oats, potatoes, flax, and in some places maize and vines; while the minerals are iron, copper, lead, coal, marble, and especially cinnabar, the quicksilver mines of Idria having been long famous. There are manufactures of linen, leather, lace, pottery, &c., and a considerable trade in timber and fire-wood. The Lake of Zirknitz (q. v.), the quicksilver mines, and the grottoes of Adelsberg, are 'the three sights of C.' Laybach is the capital.

Like Carinthia, the name C. points to a primitive Celtic population from whom the country must have received its name, 'the craggy' or 'the rugged.' Some time after the fall of the Roman Empire it appears in the possession of a Slavic race, from whom it was conquered by Charlemagne, who gave it to the Dukes of Friuli. After various changes it finally passed, in the 13th and 14th centuries, into the possession of the Hapsburgs, and has ever since formed part of the Austrian Empire.

Car'nival (Lat. *caro*, 'flesh,' *vale*, 'farewell'), a season of revelry, masquerading, and buffoonery in Italy, which originally began on the feast of Epiphany or Twelfth Day—January 6th—and ends on Shrove or Pancake Tuesday, which is called also Fasten-Even—the day to which 'farewell to flesh,' the etymological meaning of the word C., strictly refers, because next day is Ash Wednesday, on which the fasting and austerity of Lent begin. In modern times the C. season is restricted to the eight days before Ash Wednesday. Relics of the ancient heathenism of both the S. and the N. of Europe are observable in its usages. Milan and Naples were once celebrated for their observance of the C., but it was carried to its greatest perfection in Venice. At present it is seldom heard of elsewhere than at Rome.

Carniv'ora, an order of mammalia, represented by such animals as lions, tigers, dogs, wolves, bears, seals, hyænas, civets, weasels, &c., &c., and distinguished by possessing two sets of teeth, consisting of the three kinds found in a perfect dentition. The incisors are generally six in each jaw, save in some seals; the canine teeth always number two in each jaw, and are very large and prominent; whilst the præmolars and molars usually possess cutting edges—although in some animals (*e.g.*, bears) which feed on vegetable as well as on carnivorous matter, the molars may be blunted or tuberculate. The clavicles are rudimentary or wanting. The toes possess sharp claws; the teats are abdominal, and the Placenta (q. v.) is deciduate and zonary. The C. are divided into the *Pinnigrada* (q. v.) (seals), *Plantigrada* (q. v.) (bears, racoons, badgers, &c.), and the *Digitigrada* (q. v.) (lions, tigers, dogs, &c., &c.).

Car'not, Lazare Nicolas Marguerite, born at Nolay, a small village in Burgundy, 13th May 1753, studied at Paris and the military school of Mezières for the engineer service, in which, in 1784, he obtained a captaincy. His first important mathematical work, an *Essai sur les Machines en Générale*, appeared in 1786. Elected to the Legislative Assembly in 1791, he spoke chiefly on military affairs. In the National Assembly, after the deposition of the King, C. rose in importance, and his energy on the frontiers in 1793 made him practically the leader of the Committee of Public Safety. He organised the fourteen armies which destroyed the first coalition, and conquered the Low Countries. After narrowly escaping condemnation as a Terrorist, C. was elected to the Directory, where perhaps the hostility of Barras marred the success of his military administration. The revolution which Augereau and Barras accomplished in the interests of Bonaparte drove C. to Germany. He returned in 1799 as Minister of War under the First Consul, but soon retired to the country, where he composed his celebrated *Traité de la Défense des Places*. He was again called to the Tribune, in which he opposed the gradual foundation of the Empire, and once more retired to the cultivation of his favourite mathematical and mechanical science. In 1814 he offered himself to the falling Bonaparte, and was intrusted with the defence of Antwerp against the Allies; and during the 'Hundred Days' he acted as Minister of the Interior, believing in the possibility of a republic. By the influence of the Emperor Alexander he was allowed to retire to Warsaw, and then to Magdeburg, where he died, 2d August 1823. C.'s merits as an engineer and a mathematician have been questioned, but not his austere loyalty to republican principles. See Arago's *Biographie de C.* (1850), and *Mémoires of C.*, edited by his son (2 vols. 1861-64).

Car'ob, Algaroba, or **Locust-Tree** (*Ceratonia Siliqua*), a tree of the natural order *Leguminosæ*, sub-order *Cæsalpinieæ*), a native of the Mediterranean region, the pods of which are much used by the Arabs and poorer inhabitants of that region. They are also given to horses, and of late years they have been imported into Britain for that purpose under the name of *Locust Beans* or *St John's Bread*, from the idea that they were the 'locusts' on which, in addition to wild honey, St John lived during his wanderings in the wilderness. Undoubtedly, however, the food of the apostle was the insect of the same name, which to this day forms a large portion of the food of the inhabitants of the same region. It is also believed—though on somewhat fanciful grounds—that they formed the 'husks' of which the Prodigal Son of the New Testament would 'fain have filled his belly' after he had 'wasted his substance with riotous living.' Some trees will yield as much as 800 or 900 lbs. The wood is also hard, and valued as a timber; and the bark and leaves are used for tanning. The Locust-Tree of America (q. v.) belongs to another genus altogether.

Caroli'na Allspice. See CALYCANTHUS.

Carolina, North ('the Old North State'), is one of the original thirteen states of the Union. It is bounded on the N. by Virginia, on the S. by S. Carolina and Georgia, and on the W. by Tennessee, and it lies between 33° 53′ and 36° 30′ N. lat. Its greatest breadth is 180 miles, and from Cape Hatteras, on the Atlantic, to its western limit it is 490 miles in length, the area being 50,704 sq. miles. The soil is extremely poor. Inland for 80 miles it is sand and swamp. Part of the Great Dismal Swamp is on the N. Behind this tract the land rises into wooded hills onward to the Appalachian ranges, crowned with Mount Buckley, 6775 feet, the highest point E. of the Mississippi. The mountain region, having Asheville, Buncombe county, for a centre, has a very healthful and genial climate.

On the coast there are Albemarle and Pamlico Sound—sheets of shallow water separated from the ocean by low, sandy islands—the navigation of which is difficult. The chief rivers are the Roanoke, which flows into Albemarle Sound; the Neuse, entering Pamlico; and the Cape Fear River, on which stands the port of Wilmington. The principal towns are Raleigh (the capital), Fayetteville, and Wilmington. Pitch, tar, and turpentine are produced in immense quantities from the pine forests, and are valued at $2,000,000 annually. In the early part of this century N. C. was the chief gold-mining state in the Union. Coal, iron, and copper are also found. In 1872 the cotton crop was 167,653 bales, and in 1870 the farm produce was $57,845,940, and all property $260,757,244. Provision has been made in the constitution of 1868 for public schools, but the education of the common people is backward, and there are many '*poor whites*.'

The earliest English settlement in N. C. was made at Roanoke in 1587, but the colonists were never afterwards heard of. The next settlers came from Virginia about 1650. In 1662 the land was granted to Clarendon, Ashley, and six other noblemen, by Charles II., hence the name *Carolina*. John Locke, in 1672, framed his scheme of government for the Carolinas, but it was soon abandoned. The *proprietary* lasted till 1719, when

the Carolinas were separated and granted a royal government. Prior to the Revolution many Highlanders settled in the state, and the Gaelic tongue was maintained till recent times.

N. C. sends eight members to the House of Representatives. The state debt is $34,095,045. Pop. in 1870 (blacks 391,630), 1,071,361.

Caroli'na Pink. See SPIGELIA.

Carolina, South, one of the original thirteen states of the Union, lies between 32° and 35° 10' N. lat., having N. Carolina on the N., and Georgia on the S. and W. Area, 29,385 sq. miles. There is a coast-line of 200 miles on the Atlantic, fringed with islands which produce the finest sea-island cotton. For 100 miles inland the land is low, swampy, and unhealthy. It then ascends to the N.W. border, where the mountains are 4000 feet high. The chief rivers are the Great Peedee, navigable to Cheraw, the Santee, and the Savannah. The soil produces rice, tobacco, indigo, sugar, maize, and above all, cotton—the cotton crop (in 1872) amounting to 223,352 bales. The total farm products in 1870 were valued at $41,909,402; the real and personal property at $208,146,989. The state debt was $13,075,229. S. C. has gold, lead, iron, marble, sienite, and granite, besides great beds of decayed shells and bones, which have been much utilised in agriculture. Charleston is the principal city, Columbia is the capital; Beaufort has a splendid harbour, and the high inland town of Aiken is much resorted to by invalids on account of its congenial climate.

S. C., 'the Palmetto State,' was the home of Southern chivalry and politics. In 1829 it espoused Nullification—the right to annul any act of the Union—but President Jackson stamped out the movement. S. C. seceded in December 20, 1860, and fired the first gun in the civil war. It suffered most severely, and is still depressed. The state has been reconstructed, and negroes now fill many offices. It sends five members to the House of Representatives. Pop. in 1870 (blacks 415,814), 705,606.

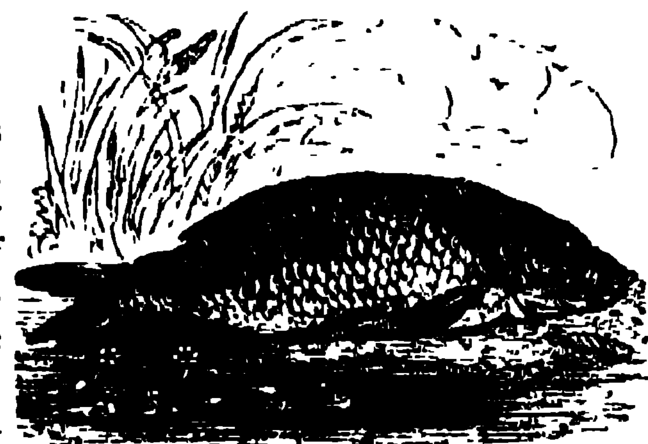
Car'oline, Amelia Elizabeth, wife of George IV. of England, was the daughter of Karl Wilhelm Ferdinand, Duke of Brunswick, and was born 17th May 1768. Married to the Prince of Wales, 8th April 1795, she gave birth to the Princess Charlotte on 7th January of the following year, when her husband separated himself from her. Her father-in-law, George III., and the nation sided with C., though reports affecting her honour were studiously circulated by the friends of the Prince. In 1814 she left England on a lengthened tour, and ultimately settled at Lake Como. An Italian, named Bergami, had been and continued to be her companion; and on her refusal in 1820 of an annuity of £50,000 to renounce the title of queen, a charge of adultery was brought against her, and sustained by a majority in the House of Lords. The feeling of the nation, however, was so pronounced in her favour that the proceedings were allowed to drop. In July 1821, being refused admission into Westminster Abbey to witness the coronation of her husband, her system received such a shock that she fell ill on the 30th of the same month, and died on the 7th of August following. Her daughter, Charlotte Augusta, was married to Prince Leopold, afterwards Leopold I., King of the Belgians. She died 6th November 1817.

Caro'ra, a town of Venezuela, S. America, about 160 miles W. of Valencia. The surrounding district is famous for its wild cochineal, in which, as also in gums, resins, balsams, and agricultural produce, a considerable trade is carried on. Leather and ropes are manufactured, and excellent hammocks are made out of maguey, a coarse fibre obtained by macerating the leaves of the *Agave Americana.* Pop. about 10,000.

Car'otid Arteries are the two large arterial vessels which supply blood to the head—one on each side of the neck, respectively called *right* and *left* C. A. The *right* common carotid artery arises from the Innominate Artery (q. v.), and the *left* from the arch of the Aorta (q. v.). The latter is therefore longer, and rises in the chest. At the upper border of the Thyroid Cartilage (q. v.) each divides into two branches, the *external* carotid artery and the *internal* carotid artery. The external carotid artery, after giving off six branches, viz., to the thyroid gland, the tongue, the face, the back of the scalp, the back of the ear, and the pharynx (q. v.), is itself divided into the *temporal* and *internal* Maxillary Arteries (q. v.). The internal carotid artery enters the skull through a hole in the Temporal Bone (q. v.), and is also divided into various branches to supply the front of the brain, the eye, &c. In wounds of C. A. and in Aneurisms (q. v.), the vessels have on several occasions, by Sir Astley Cooper and other surgeons, been successfully tied, and there are cases on record in which the carotid artery on both sides of the neck have been tied. In *garotting*, the C. A. are pressed against the bone, and blood to a great extent prevented from entering the brain.

Carouge', a town of Switzerland, in the canton of Geneva, on the left bank of the Arve, a tributary of the Rhone, and about 1 mile S. of the city of Geneva. It has a fine Roman Catholic and a Protestant church. Leather, thread, watches, pottery, and clay pipes are manufactured. A bridge across the Arve connects the town with Geneva. Pop. (1870) 5873.

Carp (*Cyprinus carpio*), a fresh-water Teleostean fish, belonging to the section *Malacopteri* of that order, and forming the type of a special family *Cyprinidæ* (q. v.), to which barbels, minnows, tenches, breams, bleaks, &c., also belong. This fish has been long known in England—at any rate, prior to 1496—and it is doubtful if the statement that it is a naturalised fish in Britain can be supported by fact and proof. The body is somewhat arched and compressed; the scales are large; the head small; a single long dorsal fin exists; the intestine wants cæcal appendages, and the air-bladder is divided, and communicates with the labyrinth of the ear. These fishes occur throughout Europe, and chiefly inhabit the waters of still ponds, and rivers which do not flow rapidly. They live to a great age, and are very prolific, over 600,000 ova having been counted in a single female of moderate size. The food consists of aquatic plants; and, as in other members of the family, the teeth of the hinder part of the mouth are so adapted as to work against the base of the skull, and so to crush and triturate the food. A C. of about six years of age will weigh on an average about 3 lbs., these proportions being in some few cases greatly exceeded. In winter these fishes bury themselves in the mud, and appear to hybernate in a manner. The golden C., or goldfish (*C. auratus*), is a hardy ally of the C. (See GOLDFISH.) The flesh of the C. is very palatable, although it has somewhat fallen in repute, presumably from the greater supply of marine food-fishes; but on the Continent great attention is in some localities paid to the rearing and breeding of these fishes, particularly in inland districts of Roman Catholic countries, where a supply of palatable fish is requisite.


Carp.

The C. is caught by means of red-worm bait, gentles, larvæ, green pea, and other vegetable baits. It is difficult to angle for, since it nibbles freely, but is a shy biter, and even when fairly hooked, may lead its captor a long race before it is finally secured. See also CRUCIAN, GIBEL, &c.

Carpa'thians, the E. wing of the great mountain system of Central Europe, encloses Hungary and Transylvania on the N., E., and partly on the S., in a vast crescent, and has an entire length of 800 miles. The C. form a system in themselves, separated from the Alps by the valley of the Danube, and from the mountains of Silesia and Moravia by the depression of the March, and are divided into (1) the Carpatho-Hungarian highlands in the N.W., (2) the Transylvanian highlands in the S.E., and (3) the woody range which binds these together. The loftiest group is the Tatra, or the Carpat, on the N. frontier of Hungary, with several peaks of nearly 9000 feet, the highest being the *Eisthaler Thurm*, so called because the only glacier in the C. is here. In the central range, granite and gneiss groups are the basis of cretaceous, triassic, and Eocene formations; the Waldgebirge is almost entirely Silurian; and in the S.E. range, igneous and volcanic rocks occur with breccia and sandstone. The lower ranges are clad in forests of cherry, oak, beech, and pine, and yield iron and other minerals. The chief rivers which rise in the C. are the Theiss, Maros, Szamos, and Körös. See Crosse, *Round about the C.* (Lond. 1878).

Car'pel. See FRUIT.

Carpenter Bees (*Xylocopa*), referred to in the article BEE, and so named from their habit of excavating nests in decaying wood. *X. violacea* is a familiar species, included in the family *Apidæ*, or true bees.

Carpenter, Ship's, the third warrant officer on board a man-of-war, whose duty it is, in conjunction with his mate and crew, to attend to the necessary repairs of the hull, masts, and spars. He sees after the condition of the boats and pumps, and during battle looks after the plugging of shot-holes.

Car'penter, William Benjamin, M.D., LL.D., F.R.S., an eminent physiologist, was born at Bristol in 1813, and graduated M.D. at the University of Edinburgh in 1839. He was appointed Professor of Medical Jurisprudence at University College in 1848, and was soon after elected Examiner in Physiology and Comparative Anatomy in the University of London. He held these offices until 1856, when he was appointed Registrar to that university. He is the author of *Principles of General and Comparative Physiology* (1839), *Principles of Human Physiology* (1846), *A Manual of Physiology, The Microscope and its Revelations* (1856), *Introduction to the Study of the Foraminifera, The Principles of Mental Physiology* (1874), and many able papers in influential periodicals. The royal medal of the Council of the Royal Society was awarded to C. in 1861. He took a leading part in the deep-sea explorations authorised by Government in 1868–70, and subsequently suggested the cruise of the *Challenger*. C. was president of the British Association at its meeting in Brighton in 1872.

Carpentras, a town in the department of Vaucluse, France, on the Auzon, 15 miles N.E. of Avignon by railway. It is encircled by promenades, and still preserves its old fortifications, containing two gates of the 14th c. It has a triumphal arch of the 3d c., an old cathedral of St Siffrein, and a legate's palace. An aqueduct of forty-eight arches, which still supplies C. with water, was constructed 1729–34. The chief manufactures are cotton, chemicals, leather, and earthenware. Pop (1872) 7857. C. the *Carpentoracte* of the Romans, and the capital of the Celtic *Meminiens*, was a flourishing town before Cæsar's invasion of Gaul.

Car'pentry (from the Lat. *carpentum*, 'a cart'), is, in its most general application, the art of working in wood and adapting it to structural purposes. The word is generally restricted, however, to the heavier class of woodwork, such as the frames of roofs or the joists of floors. The preparation of the smaller fittings about a house, as doors, window-sashes, &c., is called joinery. Cabinetmaking is essentially a higher branch of joinery. Patternmaking also—the construction of the wooden patterns and core-boxes from which the moulds in an iron or brass foundry are made—is a separate branch of C., and one which requires great skill and accuracy.

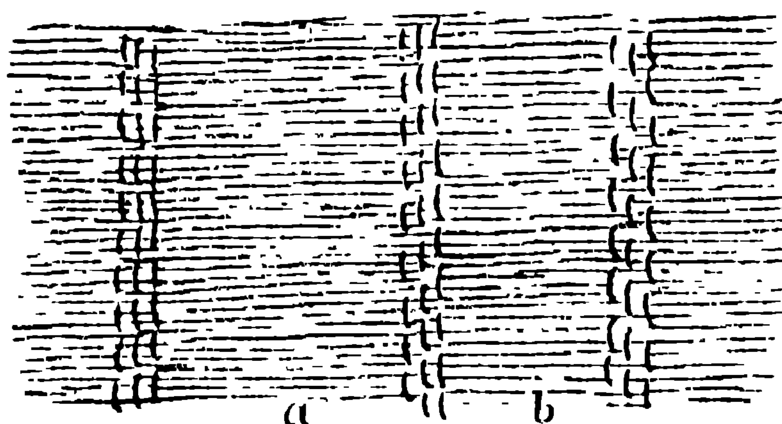
The timber has been already roughly shaped in the saw-mill before it comes into the carpenter's hands; he receives it in the form of squared logs or of planks of various sizes. The first rough cutting of the wood into the required special forms which comes fairly within the limits of C. is done by saws. Circular and band saws, both worked by power, are here of much use. The first cut up the larger pieces of wood with amazing rapidity, and are used mostly for that purpose. The band-saw consists of an endless ribbon of steel, often about half an inch wide, and so thin as to be quite flexible, with teeth upon one side, which is carried over two large rapidly-revolving wheels. The work is held upon a suitable table, and pressed against the saw, which, owing to its narrowness, can be made to cut out very complicated patterns with great ease. Band-saws differ in form according to the nature of the work for which they are to be used. The ripping-saw and band-saw are for the larger pieces; the tenon-saw is used for cutting small pieces across the grain; it is very thin, and strengthened by a rib upon its back; the key-hole-saw is employed for cutting along a curved line.

The wood is smoothed by *planes*. The jack-plane is used for rough work, and the larger trying-plane for finishing a surface where accuracy is required. The little smoothing-plane has many applications; and moulding-planes, the irons of which are formed to special patterns, are used to cut long ornamental edges or moulds. For paring wood, or forming the edges of recesses or holes, chisels of different sizes are used. Common chisels are called by carpenters firmer or paring chisels; and the thicker and narrower variety used for cutting narrow slots are mortise-chisels. Gouges are simply curved chisels, used in paring circular or curved holes or recesses. For boring small holes for nails a bradawl is used, and for screws a gimblet. For somewhat larger holes a bit or centrebit is the tool commonly used. It is usually placed in a frame called a brace, having a cranked handle, by means of which it can be turned round. Most of the operations of C. can be performed by machinery, and in cases where large numbers of pieces of the same or similar form have frequently to be made, wood-working machinery, as it is called, is often employed, and its employment seems to become more extensive every year.

In the lighter kinds of woodwork, the different pieces are fastened together with glue, nails, or screws, as may be most suitable. Various forms of dovetail and mitre joints are also used in cabinetmaking, when appearance as well as stiffness has to be considered, but the more important forms of joint in woodwork are those which occur in C. proper, where strength is the principal thing to be considered. The form of these joints, drawings of which will be found in all books on C., depends on the nature of the stress which they have to resist. In most cases they weaken the piece in which they occur very considerably, and it is therefore important to use them as seldom as possible, as well as to employ the best proportions when they have to be used. A piece which has to resist direct tension is jointed either by scarfing or fishing, or both. In the former, which is the neater but less strong, each of the two ends which come together is stepped, or cut away, for a certain distance, so that when they are put together the apparent size of the beam at the joint remains the same as it is elsewhere. Bolts passing through the scarfs or steps hold them together. In a fished joint, the ends of the two pieces are simply squared and made to abut, while on each side of the beam a separate piece of wood is placed, the whole being secured through bolts of iron. If the joint is to be in compression, the principal point to be attended to is that the abutting surfaces should be true, and as nearly as possible normal to the direction of the thrust. To make the strongest possible joint, the upper and lower parts of the beam should be cut as little as possible, as its strength is far less impaired by cutting it away about the middle of its depth. See Riddell's *Carpenter, Joiner, &c.* (T. C. Jack, Edinb. 1876).

Car'pet (Fr. *carpette*, Low Lat. *carpeta*, 'woollen cloth,' from *carpere*, 'to pluck wool'), a woven or felted covering for the floors of apartments, usually made entirely or in great part of worsted. The principal seats of C. manufacture in Great Britain are at Kidderminster, Halifax, and Leeds in England, and Kilmarnock, Glasgow, Bannockburn, and Aberdeen in Scotland; but a considerable trade in a cheap carpeting of jute is also carried on in Dundee. The principal varieties of carpets are—1st, Kidderminster or Scotch; 2d, Brussels; 3d, Wilton; 4th, Tapestry; 5th, Turkey or Persian; 6th, patent Axminster; and 7th, felted carpets. Kidderminster, or Scotch carpets, are very extensively manufactured at Kilmarnock in Scotland, the warp being made of worsted yarn and the weft of wool. The carpets are made either two-ply or three-ply; that is, of two or three distinct webs interwoven so as to form one piece. The patterns are produced by the different coloured webs being alternately brought through each other to the surface, so that, although the design is the same on both sides, the colours in which it is wrought are reversed. The weaving is of course done in the Jacquard Loom. Brussels carpets are a more expensive manufacture than the Kidderminster or Scotch kinds; the back is composed of a web of stout linen thread, and the pattern is produced by a surface of coloured worsted warp threads being woven down into the linen texture. The worsted warp has a round looped pile, produced by passing it over iron or steel wire in the process of weaving. Only a limited number of colours can be used in a Brussels C., and as a large proportion of the coloured worsted yarn is absorbed in the back of the C., much material is practically wasted, while no great latitude of design can be introduced. Wilton or velvet-pile carpets only differ from Brussels in having the raised loops cut before the wire is withdrawn, and thus producing a velvety surface. Tapestry carpets, which have a pile and superficial appearance like Brussels carpets, are made by printing the warp yarn before

weaving, whereby the use of the complex frames and numerous bobbins required for Brussels C. is avoided, and the waste of yarn in the body of the texture obviated. The process of preparing the yarn was the invention of Mr Richard Whytock of Edinburgh, and consists of drawing the pattern—not as it appears when woven, but as it would be with the threads fully stretched—on design paper, and printing the yarn according to it. Turkey carpets are the variety originally introduced to Western nations by the returning Crusaders. They are made with a warp and weft of very strong linen yarn or twine, with which are interwoven tightly tied tufts or short lengths of wool, coloured according to the pattern to be produced. The ends of the tufts stand up at right angles to the plane of the warp, and after the entire C. is woven and fastened by this very tedious process, the surface is cropped even with a pair of shears. The original Axminster carpets were simply imitations of Turkey carpets; but in 1839 Mr James Templeton obtained a patent for the manufacture of patent Axminster carpets, and by his process the most beautiful and durable carpeting is now made. The first idea of his process he obtained from 'Chenille' shawls, in the manufacture of which he was engaged. A pattern is drawn upon paper ruled in narrow parallel lines, which lines are cut up into strips for the guidance of the weaver. A loose parti-coloured web of any breadth up to a yard is then woven according to the colours of the guiding strips, only a few warp threads passing through the reed at intervals regulated according to the depth of pile which the chenille is to have. The web is cut into strips along the divisions (*a*, *b*) between each set of warp threads, by a machine forming the chenille, and each strip is then a duplicate of the paper pattern strip. When one of these strips is woven on to a solid back, and the worsted pile combed through some of the warp threads to attach it to the back, a duplicate of the original paper pattern is seen, and each complete strip of chenille makes an additional copy of the pattern. Felted wool carpets are chiefly prepared by printing patterns on the surface of the felted fabric, and they are used as drugget or crumbcloth.



Chenille for Patent Axminster Carpet.

Car'pi, a walled town of Italy, province of Modena, on the Secchia Canal, 9 miles N.N.W. of Modena, has a cathedral, an old castle, a citadel, and numerous palaces. The chief industries are the manufacture of silks and straw hats. Pop. 17,504. C. is also the name of a village, 28 miles S.E. of Verona, near which Prince Eugene defeated the French in 1701. Pop. 1200.

Carpi'ni, Giovanni de Plano, an Italian traveller of the order of the Franciscans, born in Capitanata, Naples, about 1220, was sent in 1246 by Innocent IV. as a sort of papal legate to the Mongol Emperor, whose devastations in the N.E. of Europe were alarming Christendom. He was present at the election of a new emperor in the capital of Genghis-Khan. After a month's residence at the Mongol court, and a visit to Tourakina, the Emperor's mother, C. returned to Europe. He was the first who gave a trustworthy account of the Mongols and of their country. An English translation of a Latin abridgment of his travels, which appeared in the *Speculum Historicum* of Vincent de Beauvais, is attributed to Hakluyt or Purchas. The exact date of C.'s death has not been ascertained, but the latter portion of his life was spent in missionary efforts in Bohemia, Hungary, Denmark, and Norway. See Peschel's *Geschichte der Erdkunde*, pp. 150-207, and an article by Dora d'Istria in the *Revue des Deux Mondes* (Feb. 15, 1872).

Carpi'no, a town of Italy, province of Foggia, near the N. coast of that peninsula (the 'spur of Italy'), which, projecting into the Adriatic, forms the Gulf of Manfredonia. Pop. 6000.

Carpoc'rates, or **Car'pocras**, of Alexandria, one of the earliest teachers of heresy in the Christian Church, and the founder of a sect, the Carpocratians, which existed from the 2d to the 6th c. His teaching coincided in most respects with that of Basilides (q. v.), and his followers called themselves gnostics—essential parts of the system being metempsychosis and the creation of the world by angels. See Neander's *Kirchengesch.*

Car'polites, a term applied to fossils of the nature of fruits, but which it is impossible as yet to refer to their exact place in the vegetable kingdom. They are chiefly found in the Carboniferous system.

Carpol'ogy, the division of botanical science which concerns itself with the study and classification of the forms of fruit. See FRUIT.

Carpoma'nia, or **Phytolithes**, an affection of quinces, pears, &c., in which, by the deposition of layer after layer in the cells of the fleshy fruit, they become gritty. It is, however, scarcely a disease, as it occurs naturally in pears, melons, &c., and the gardener's efforts are directed, by means of cultivation, to reduce it to a minimum, by creating a condition which is not natural to the fruit. (Masters.)

Carpopto'sis, a term applied to the disease in plants which causes the fruit, after it has begun to 'set,' to have its progress suddenly arrested and to fall off. It is frequently owing to more fruit being formed than the tree is capable of nourishing, or from the tree being covered with so many shoots that the sap which should go to the fruit is diverted to nourish the foliage. In Italy the rice crops are often so affected.

Carra'ca, La, a great naval arsenal of Spain, province of Cadiz, on a low-lying island, formed by the cutting of the Santi Petri Canal, which separates it from the mainland. It is about 4 miles S.S.E. of Cadiz, and is defended by four forts and the Castillo de Santi Petri.

Carr'ageen, or **Irish Moss** (*Chrondrus crispus* and *C. malefiosus*), small sea-weeds, found commonly between tide-marks around the British, North American, and European coasts. On the coast of Ireland they are extensively collected, dried, and bleached. The product is then sold under the name of 'I. M.,' the name 'C.' being also of Irish origin. When boiled with milk, it forms a stiff jelly on cooling. It has nutritive, emollient, and demulcent properties; and on account of the iodine which it contains, is also of medicinal value in cases where this drug is of avail.

Carrajal', Tomas José Gonzalez, a Spanish statesman and author, was born at Seville, 21st December 1753, studied at the university of his native city, and in 1785 went to Madrid, where he devoted himself to politics and philology with equal zeal. From the outbreak of the French Revolution to the reactionary war of 1823, except for a short period (1815-20), he was constantly engaged in public affairs, and showed both ability and patriotism. After repeated affronts and persecutions by the Absolutist party, he was finally received into the royal favour, and became a member of the Supreme Military Council in 1833, but died 9th November 1834. As an author, C. has obtained a great reputation in Europe by his metrical translation of the poetical books of the Bible, begun in his fifty-fourth year, and heroically persisted in amid the din of arms, the distractions of campaigns, and even the fatigues of a march. The fruits of this labour are seen in *Los Salmos* (5 vols. Val. 1819), and *Los Libros Poeticos de la Santa Biblia* (6 vols. Val. 1827). His original compositions are contained in the *Opusculos ineditos en Prosa y Verso* (13 vols. Mad. 1847).

Carra'ra, the famous marble emporium of N. Italy, province of Massa-Carrara, lies in a valley of the Apennines, on the Avenza, near where it enters the Mediterranean. It is an old town, and many of the larger buildings are of marble, as the fine churches of the Madonna delle Grazie and St Andrea, as also the beautiful fountain in the Piazzo Alberigo. C. has a sculpture academy, founded by Napoleon, and is the residence of a colony of artists. Its sole industry is the cutting, polishing, and transport of marble. Pop. (1872) 23,827. In the vicinity are the quarries, thirty in number, of which, however, only half-a-dozen yield the fine mineral for sculpture. They have been wrought for over 2000 years, and are now yielding, with the aid of English machinery, £75,000 worth of marble yearly. The C. marble is an Oolitic limestone, the chief qualities of which are its beautiful whiteness and its durability.

Carr'el, Nicolas Armand, one of the ablest French journalists of the 19th c., was born at Rouen, 8th May 1800. He served in the army for a short time, but soon went to Paris, where he devoted himself to journalism and politics. He became the editor of the *National* newspaper, and, in its columns, advocated with great ability and perfect fearlessness opposition to the government of Charles X. and to despotism of every kind. Unfortunately he came into collision with another journalist, M. Emile de Girardin, and in a duel which ensued was mortally wounded, and died July 24, 1836. A just and eloquent estimate of C. is to be found in the writings of the late Mr John Stuart Mill. An edition of his works was published at Paris in 1858.

Carri'age, a general name for a great variety of wheeled vehicles. See COACH, CART, WAGGON, OMNIBUS, GUN-CARRIAGE, &c.

Carr'ical, or **Karikal,** a French territory and port, enclosed by the district of Tanjore, on the delta of the Kavari, 152 miles S. of Madras. The territory, which has an area of 50 sq. miles, and a pop. of 50,000, was ceded to France by the native ruler in 1759, and was afterwards taken by the British, but restored to the French in 1814, on the condition that the town of C. should not be converted into a military stronghold. The town is only accessible by the river to coasting vessels, and that merely during tne rainy season.

Carrickfer'gus ('rock of Fergus'), a seaport of Ireland, on Belfast Lough, 11 miles N.E. of Belfast by railway, and extending about a mile along the N.W. shore of the lough. It is defended by its castle, which is situated on a promontory, and is supposed to have been erected in the 12th c. The keep has an elevation of 90 feet, and is maintained as a fortress, the works, formerly mounted by numerous cannon of small calibre, being now furnished with more formidable ordnance, to enable it to command the mouth of the lough. The greater part of the commerce of the town, formerly considerable, has been transferred to Belfast. The trifling imports consist of coal, iron, timber, slate, &c., and the exports of grain and black cattle. But there are considerable industries, especially the spinning of linen and cotton yarn; there are also a large distillery, extensive tanneries, a bleaching establishment, and a starch manufactory. C. depends much on visitors during the bathing season, and on its oyster and other fisheries. It returns one member to Parliament. Pop. (1871) 9397. William III. landed at Carrickfergus, 14th June 1690—less than a fortnight before he fought the battle of the Boyne.

Carr'ick-on-Suir ('the rock of the Suir,' so named from a large rock in the bed of the river), a town of Ireland, in county Tipperary, picturesquely situated on the Suir, 12 miles E. of Clonmel. It has increasing manufactures of woollens, flax, and linen. Some ruins of a castle, dating from 1309, are still visible. Pop. (1871) 8055.

Carr'ier, Jean Baptiste, born at Yolai, in Upper Auvergne, in 1756, was elected to the National Convention in 1792, and took a leading part in the constitution of the Revolutionary Tribunal. He voted for the King's death, and distinguished himself by the savage and indiscriminate cruelty with which he suppressed the risings in the W. He constructed an 'Entrepôt' at Nantes, the prisoners in which were murdered wholesale by drowning, without even the pretence of a judicial process, though this was sometimes gone through in the case of persons already dead. C. concealed his crimes from the Convention by the use in his orders of such expressions as '*translation des détenus*,' which his subordinates understood to mean shooting or drowning. The Committee of Public Safety at last began proceedings against him, but it was not till 16th December 1794 that the Revolutionary tribunal carried through his execution.

Carrier Pigeon, a variety of *Columbidæ* or Pigeons (q. v.), noted for the exercise of the 'homing' faculty, by means of which these birds find their way to their homes or original haunts from great distances—a power made use of occasionally for the purpose of conveying letters—*e.g.*, during the late siege of Paris. The C. P. has been known to fly 150 miles in 1½ hours, and many instances might be related where their services have been of great help. It is needless to remark that the electric telegraph has almost entirely superseded the use of these birds. Before flight they were kept in the dark for at least eight hours, and were not fed—the birds also eating moderately on arriving at their homes. The sense of sight and knowledge of landmarks appear to be the chief means whereby the flight is guided. About 30 miles an hour is the average rate of speed. Carrier pigeons are usually kept away from their nest not longer than ten days or a fortnight, and during the period of tending their young the homeward flight is said to be made more quickly than at other times. The *Columba Turcica* or *tabellaria* are the designations applied to this variety of pigeon, and several sub-varieties are described.


Carrier Pigeon.

Carr'iers, the name originally given in England and Scotland to the conveyers of goods from town to town in waggons or carts only, but, in the later and wider industrial sense, to the large class employed in the conveyance, by whatever means, of all articles of commerce, &c. The trade is carried on in the East chiefly by caravans, in Spain by muleteers, and in countries where transit is more thoroughly developed by rivers, canals, and railways. All the navigation of the oceans and seas is nothing other than the international development of the carrier's occupation. The packhorse was superseded in England by the four-wheeled waggon, and in Scotland by the one-horse cart. The waggon had a hooped top with a movable canvas covering, and a space behind—the 'tail of the waggon'—was spread with straw for the use of such passengers as might avail themselves of it for a whole or a portion of the journey. The palmy days of the waggon in England and the carrier's cart in Scotland are gone. The latter still conducts a fairly profitable trade in districts not opened up by railways; but formerly his departure, progress, and arrival were timed with an accuracy which has been little, if at all, improved upon by railway luggage trains. In England the formation of canals, by increasing the facilities for carrying, had a wonderful effect in multiplying the quantities of goods to be conveyed from place to place. The Canal (q. v.) was the earliest successful rival of the waggon on a large scale, and its era dates from the last quarter of the 18th c. The Lancashire cotton trade, the woollen trade of Yorkshire, Staffordshire potteries, and the hardware manufactures of Birmingham, all received an impetus by the development of the canal system, which may be looked back upon as the beginning of the enormous wealth of these centres of industry. The Forth and Clyde Canal in Scotland, completed in 1790, was the first interference with the monopoly of traffic enjoyed by the carriers's carts between the E. and W. of Scotland, especially between Edinburgh and Glasgow. See CANAL.

The railway is the latest development of the carrying trade. It drove the waggon and cart entirely off all the highways of commerce, and diminished canal traffic to an extent ruinous to the value of shares in that kind of enterprise. Some canals in England have since been altogether abandoned. Those that continue open, such as the Grand Junction, the Lea Navigation, the Trent and Mersey, and the Forth and Clyde in Scotland, are used mainly for the conveyance of minerals, stone, slate, lime, bricks, manure, and other cumbrous materials. Manufactured goods are generally sent by the railway. (See RAILWAY.) These improved means of conveyance have had the effect of enormously increasing the number of horses and men employed in the city carrying trade. This was apparent in the flourishing days of canals. Crowds of carters awaited the arrival of the numerous boats. In Glasgow, for example, there used to be an enormous trade in carting coal and iron from the Monkland Canal basin to the Broomielaw. This is now all but abolished by local railways. Just as the earlier C. became boatmen, and those of them who had made money the proprietors of boats, so when railways began, the C. took advantage of them for the conveyance of the goods they had undertaken to deliver. Thus the C. collected the articles to be sent, put them on trucks, and received them at the railway station to which they were directed, being entirely

responsible to the senders of them. The C. paid the railway company according to its tariff, and charged the senders of goods according to a scale of their own. But this system has been discontinued for about thirty years. The railway companies now make all the charges for carrying goods, and become responsible for them on certain conditions. They however give employment to an enormous number of horses and lorries in the villages, towns, and cities. These generally belong to individuals or companies, who have no other connection with the railway company than the contract by which they undertake and are obliged to convey goods to and from the railway stations. In the Midland Counties and the S. of England, with London as their centre, Pickford & Co. and Chaplin & Horne employ thousands of men and horses in this development of the carrying trade. In the N. of England, with headquarters at Manchester, Carver & Co. also do a most extensive trade. They keep more than 500 horses in Manchester alone. In Scotland, Mutter and Howey are the great railway C. of the eastern counties, their headquarters being Edinburgh, while Wordie & Son in Glasgow do a business proportionate to the vast activity of the commercial capital of Scotland. But even this system is becoming modified. The railway companies show a desire to take possession of the entire trade, with horses and lorries of their own. Thus lorries and goods vans, with the name of railway companies on them, instead of that of Pickford or any other private company, are quite commonly seen in the streets of London and other cities. This would seem to be a step towards an ultimate comprehension of the carrying-trade by the railway companies. A rapid and punctual means of conveyance is afforded by the various Parcels' Delivery Companies, which have receiving offices in numerous business centres, and deliver goods a certain number of times daily.

Carriers, Wharfingers, and Warehousemen, Law respecting.—All persons carrying goods for hire are, in law, *common C.*, and are bound to receive and carry goods for reasonable hire, to take due care of them in their passage, to deliver them in the condition in which they were received, or, in default, to make compensation, unless the loss arise from the fault of the sender of the goods or from natural cause. See, under ACT, *Act of God.*

Hackney-coachmen in London are not so bound, unless there is a special agreement and money is paid for the carriage. *Special C.*, who professedly do not carry for all, are not *bound* to carry. When, however, a special carrier undertakes to convey goods, his responsibility is the same as that of a common carrier.

The master of a stage-coach who only carries *passengers for hire*, is not liable for goods, but if he carry goods also for hire he is liable. A carrier who opens a package intrusted to him, and abstracts goods, is guilty of felony. A common carrier, who has convenience, being offered his hire and refusing to carry goods, is liable to an action; but he may refuse to admit goods to his warehouse at an *unseasonable* time or before he is ready to start on his journey. A carrier robbed is liable to the sender, but he has recourse against the *Hundred* (q. v.) to make good his loss. As a usual rule, a carrier is bound to deliver goods as directed; when it is not his custom to do so, he must send timely notice of the arrival of the goods. A carrier has a Carrier Lien (q. v.) on goods which he carries for hire, but it is limited to the carriage of each parcel, and is not for any balance due to the carrier from the sender, or for a debt due to the carrier by the consignee. The powers and liabilities of railway companies in the carriage of goods are similar to those of C. and stage-coach proprietors.

Warehousemen are bound, when goods are stored in a warehouse, to bestow reasonable care on them, to prevent damage or injury. *Wharfingers* are bound in the same way; but neither is liable for damage from accidental fire. The responsibility of common C. for a package containing gold or silver, precious stones, bills, notes, silks, laces, or other valuable articles specified in the Act, is limited to £10, unless the value be declared on sending, and an extra charge be accepted.

Law of the Road.—When carriages or horsemen meet on a public road, the law, in case of accident, is always against the aggressor. A driver or rider, on passing another horse or carriage, must keep on the whip-hand of the horse or carriage. He will be answerable for any damage which may arise from neglect of this rule. A driver, however, is not bound to keep on the left side of the road, provided he leave sufficient room for other carriages and horses to pass him on their proper side.

Carr'ion Crow (*Corvus Corone*), a species of *Corvidæ* or Crows (q. v.); but this name is also given to the black vulture, an American species of that genus of birds. See VULTURE.

Carrion Flowers, the flowers of various species of *Stapelia* (natural order *Asclepiadaceæ*) of the Cape of Good Hope, so called on account of the putrid odour exhaled by them. The name is also applied to *Coprosmanthus herbaceus*, and in America to *Smilax herbacea.*

Carr'on, a village in Stirlingshire, on the right bank of the C., 3 miles E.N.E. of Falkirk, noted for its extensive iron-works, established in 1760. Pop. of village, including iron-works (1871), 1088.

Carronades', short iron guns, attached to the carriage by a loop and bolt instead of trunnions. They have less thickness of metal than other guns of the same calibre, and have at the muzzle a cup or chamber for powder, like mortars. But admitting only of a small charge of powder, their range is confined; hence they are effective only at close quarters; and ships armed only with C. have been beaten by vessels of nominally smaller armaments with long-range guns. They have become all but obsolete. C. were invented by Mr Gascoigne, manager of the Carron Ironworks in Scotland, and were made standard navy guns in 1779, to be carried on the poop, forecastle and upper works.

Carron Oil consists of equal parts of olive oil and lime-water well shaken together, a useful application to *Burns* (q. v.), so called because first used at Carron Ironworks, near Falkirk.

Carr'ot (*Daucus Carota*), the cultivated form of which yields the well-known esculent root of that name. It belongs to the natural order *Umbelliferæ*. The genus *Daucus* contains several species, mostly natives of the Mediterranean region. *D. Carota* is indigenous to Britain, most parts of Europe, and the Caucasus, and has been cultivated in Europe, China, Cochin-China, in the European colonies, N. America, &c., from very early times; in England at least as early as the 16th c. In Charles II.'s reign ladies wore C. leaves instead of feathers in their hats. The plant succeeds best in sandy or peaty soils, but is liable to the attacks of the C.-Fly (q. v.) and Crane-Fly (q. v.), the larva of which destroys the young roots. C. is not very nutritive, containing a large number of heat-forming principles, but little flesh-forming matter. It is, however, easy of digestion, and slightly laxative. A syrup is prepared from C., and, when dried and roasted, it is used in Germany as a substitute for coffee. The *Candy* or *Cretan C.* is *Athamanta cretensis*; the *deadly C.* is a name often given to *Thapsia*; and in Tasmania the tubers of *Geranium parviflorum* are called the *native C.*

Carrot-Fly (*Psila rosæ*), a species of *Dipterous* insects, the larvæ of which burrow in the root of the carrot, and cause the diseased condition known as 'rust.' Some moth-larvæ also injure this plant, and the *Aphis-dauci*, one of the plant-lice, causes the death especially of young plants.

Carrou'sel (a French word, meaning a tilt, a tilt-yard, introduced from the Ital. *carrosello*, dim. of *carro*, Lat. *carrus*), was applied to a knightly competition which put skill and horsemanship to the test, but did not require the courage of the tournament. The competitors in this exercise, which was common in Europe till the close of the 17th c., dressed in imitation of the knights of earlier ages; and a favourite feat in France was to run at the pasteboard head of a Turk with a lance, to cut it down with a sword, or to hit it with a pistol-bullet. It was introduced into France during the reign of Henri of Navarre, but was known in Italy some time before. The *Place du C.* in Paris was named after a celebrated one held there in 1662.

Carse, a word of uncertain derivation (probably Celtic), used in Scotland to denote level alluvial soils in the neighbourhood of rivers. The two most notable are the C. of Stirling, lying around the windings of the Forth, and the C. of Gowrie, on the N. side of the Tay, both of which are extraordinarily fertile. The yield of wheat is particularly great, and it can be grown more frequently on the same land than on any other kind of soil in Scotland. C. land is also well suited for beans, and indeed shows some of the finest bean-fields in the country.

Carstares', William, an influential Scotch politician and ecclesiastic of the 17th c., was born at Cathcart, near Glasgow, February 11, 1649, and studied at the Universities of Edinburgh and Utrecht. In Holland he was introduced to the Prince of Orange, over whom he acquired such influence, mainly by his knowledge of men and of politics, that he became his confidential adviser. When he returned to England he was imprisoned and tortured on the suspicion of being implicated in the Rye House Plot, but refused to betray any state secrets. On being liberated he repaired again to Holland, and was made one of the Prince's chaplains. He accompanied the Prince to England in 1688, and till the end of William's reign was his chief adviser in regard to Scotch affairs, being, in consequence, nicknamed 'Cardinal C.' During the reign of Anne he was elected Principal of the University of Edinburgh, and was presented to the church of Greyfriars. An evidence of his popularity in the Church of Scotland is afforded by the fact that he held the office of Moderator of the General Assembly four times within eleven years. C., who was strongly in favour of the union between Scotland and England, and of the establishment of the Hanoverian dynasty, opposed the disastrous Act restoring private patronage in the Church of Scotland. He died in August 1715. He was a man of sincere patriotism, piety, and sound scholarship; moderate in his opinions, and so benevolent that he even took a delight in aiding those who differed from him in opinion. Altogether he is one of the most pleasing figures in Scotch Church history. See *Life of C.* (1874), by the Rev. Dr Story of Roseneath.

Car'stens, Asmus Jakob, a Danish painter, born at St Jürgen, Slesvig, 10th May 1754. He studied for seven years in Copenhagen, afterwards removed to Berlin, where he won reputation and a professorship in the Academy, and in 1792 removed to Rome, where he at last achieved the success for which he had so long striven in vain. He died at Rome, 26th May 1798. C.'s chief works are 'Fall of the Angels,' the 'Visit of the Argonauts to the Centaur Chiron,' and 'King Œdipus.' All his works have been engraved by Muller (1869). See Fernow's *Life of C.* (1806; new edition by Riegel, 1867).

Cart (Lat. *carrus*), an uncovered two-wheeled carriage, used chiefly for agricultural and carriers' purposes. There are numerous varieties of carts, differing in size, form, and internal arrangements, according as they are meant to carry farm produce or specific articles of merchandise. Those that are employed for the latter purpose constitute the more important class. As, however, the carts of different countries vary much, so, in like manner, those of one country differ in their mode of construction to suit the kind of goods to be carried. One of the most useful vehicles for general merchandise and agricultural produce is the single-horse Scotch C. It carries from 18 to 22 cwt., and is formed, beside the axle and wheels, 4½ feet in diameter, of a rectangular body and two shafts, with raised sides inclined outwards, and additional 'top-sides,' movable at pleasure. In Scotland this C. is in universal use for farm purposes; though usually drawn by one horse, two horses, one in front of the other, are sometimes yoked to it when the weight is increased, a plan which it is not advisable to adopt, as it leads to a wasteful expenditure of animal force, with less satisfactory results than if two single-horse carts were employed. When a bulky load, such as corn in the straw, or hay, is to be carried, the area of the C. is augmented by placing a sparred wooden frame upon the sides, beyond which it projects. A 'tilt' Scotch C. is so constructed that by withdrawing a pin in the fore part of the C., the body may be tilted up and its contents discharged behind without unyoking the horse. In England, the principal vehicle for carrying merchandise is the four-wheeled Waggon (q. v.). Vehicles moving on two wheels of solid wood, and drawn by two oxen, were known to the ancients.

Cartage'na, an ancient town in the province of Murcia, Spain, on the Mediterranean, 25 miles S.S.E. of Murcia, with which it is connected by railway. It lies on a narrow inlet, has a splendid harbour, and is the seat of a bishop and an important naval station, with an arsenal and extensive marine establishments. Its chief buildings, mainly built of red marble, are its ruined castle, three fine churches, several convents, two hospitals, and a theatre. It has beautiful promenades. The chief manufactures are cloth, hemp, glass, and esparto textures, and there is a large trade in barley, wheat, silk, fruit, and minerals. In 1872, besides Spanish ships, there entered the port 686 vessels of 339,549 tons, and cleared 657 of 297,948 tons. New breakwaters were in course of construction in 1873. The neighbouring *Sierra de C.*, with which C. was connected by a tramway constructed by an English company in 1873, employs 12,000 persons in its silver, lead, copper, and ironstone mines. C. has also much shipbuilding and tunny-fishing. The town has bad water. Pop. 26,106. C., the *Carthago Nova* of antiquity, was founded by Hasdrubal in 228 B.C., near the once valuable silver-mines. It soon became the chief Punic city in Spain, and was taken by Scipio the Younger in 210. Under the Romans it was only second in importance to Tarraco. Destroyed by the Goths, it was not till the reign of Philip II. that it began to recover, but by the end of the 18th c. it had a pop. of some 60,000. C. capitulated to the French in 1823.

Cartagena de las Indias, the capital of the province of Bolivar, New Granada, on the Caribbean Sea, is the seat of a bishop, and has a beautiful cathedral, a *Collegio*, and many fine churches. It is the best harbour on the whole N. coast of the continent, being sheltered by several islands, and is the staple place for the trade of New Granada, Peru, Central America, and the Philippines. The water, however, is bad, and the climate unhealthy. Pop. 9000, not including the suburbs Xeremani and San Felipe. C. was founded by Don Pedro de Heredia in 1544, and later, having become a nest of pirates, was burned by Francis Drake in 1588. It became a free haven of import in 1856.

Carte, Thomas, a historian of much exactness and erudition, was born in April 1686, at Clifton, Warwickshire. He matriculated at Oxford, but graduated at Cambridge. Jacobite leanings forced him to relinquish a clerical post at Bath; and being suspected of a part in Atterbury's plot, he fled to France, where he remained for twelve years under an assumed name. Afterwards, however, he returned, and died near Abingdon in 1754. C. published an edition of *Thuanus* in 7 vols., but his chief works are a *Life of James, Duke of Ormond*, and his *History of England*. Though marred by partisanship, both are valuable, particularly the latter, which is full of materials for history. His MSS are preserved in the Bodleian Library.

Car'tel (from the Ital. *cartello*, a dim. of *carta*, Lat. *charta*, 'paper'), in military language, was originally a *written* agreement between belligerents for an exchange of prisoners. A C.-ship is one commissioned in time of war to carry proposals of any kind between the hostile powers; it conveys the exchanged prisoners when wanted for that purpose. The name is also used to denote a challenge to fight a duel.

Car'ter, Elizabeth, a lady noted for her scholarship, was daughter of the curate of Deal, where she was born, December 16, 1717. She wrote verses when she was seventeen years old, published poems at the age of twenty-one, and acquired nine languages. In 1738 she translated from the Italian of Algarotti *An Explanation of Newton's Philosophy, for the Use of Ladies.* Dr Johnson was her friend; and papers 44 and 100 of *The Rambler* are from her pen. She was unmarried, and died in 1806. See Pennington's *Memoirs*, 1807.

Car'teret, John, Earl Granville, an English statesman of the 18th c., was born 22d April 1690, being the son of Baron Carteret of Hawnes, Bedfordshire. He was educated at Westminster School and Oxford University, and from the latter carried away the reputation of considerable scholarship. He entered the House of Lords in 1711, and then, mainly, it is supposed, from his having spoken in favour of the Protestant and Hanoverian succession, obtained the favour of George I. He subsequently filled several important public offices. He was Ambassador-Extraordinary to Sweden, and succeeded in concluding a peace between Sweden, Prussia, and Hanover. In 1721 he was appointed Secretary of State, and on two occasions—from 1724-26, and from 1729-30—was Lord-Lieutenant of Ireland, his conciliatory manners gaining him much popularity there. C. was one of the ablest opponents of Sir Robert Walpole, and when that statesman fell, became Secretary of State, and real head of the ministry. When Pelham formed, in 1744, his parti-coloured cabinet, derisively known as the 'Broad-Bottom Ministry,' C., who on his mother's death had succeeded to the title of Earl Granville, was, like Pulteney, excluded from

it. After this he may be said to have retired from public life, although he continued a favourite at court. In his latest years, and indeed throughout his life, he was honourably distinguished as a friend and patron of men of letters. He died 2d January 1763. C. was a brilliant orator, but a somewhat undecided statesman.

Car'thage (the original Punic *Kartha-hadtha*, means 'New City,' in opposition to *Utica*, the 'Old City'), was probably founded, as a colony from Tyre, about 823 B.C. It stood at the head of a bay in the territory afterwards the Roman Zeugitana, and now Tunis. C. was tributary to Tyre for some time, and also paid a tax for occupation to the native Libyans. Before her foreign conquests began, C. probably possessed in sovereignty the whole district now called Tunis, including the rival settlement of Utica, and had founded many factories on the African coast, from which she derived large taxes and duties. At one time she occupied a sort of hegemony among Tyrian colonies, of which many at a distance, such as Cyrene, finally succumbed. C. made a treaty with Rome in 508 B.C. The Romans were not to sail beyond the *Pulchrum Promontorium*; merchants offering goods for sale in Sardinia, Africa, and Sicily (so far as belonging to C.) were to pay no customs, but the usual fees to the scribe and crier; the Carthaginians were not to take any Latin city or to inflict injury on those under the Roman jurisdiction. Probably Corsica and the Balearic Islands also belonged to C. at this time. By a later treaty, to which the Tyrians and Uticeans are parties, Roman trade is excluded from Africa and Sardinia, but permitted in Sicily and in the city of C., the Romans conceding the privilege of trade in Rome. In Sicily, however, C. received, in the year 480, a severe check from Gelon of Syracuse, who granted peace only on condition that the practice of human sacrifices (a part of Phœnician religion) should be discontinued. Shortly after this the Periplus of Hanno, one of the military Suffetes, took place. Hanno took possession of the African coast as far as Cerne, in the 25th degree of N. latitude, distributing about 30,000 emigrants in settlements, the subsequent history of which is not known. The Periplus (criticised in *Dodwell's Dissertation*) lasted twenty-six days. Himilco, another member of the Barca family, is supposed to have sailed to Cape Finisterre. The dates at which the commerce of C. with Spain and Gaul began to develop are not fixed. There was a trade in precious metals from the modern Andalusia: it is said that Himilco even reached the Scilly Isles. C. had now permanent possessions at Panormus, and Motya in Sicily; and about 410 the people of Legeste craved her intervention between them and Selinus. This led to the destruction of Selinus, Agrigentium, Camarina, and Gela, and the war against Syracuse, whose tyrants, Dionysius and the Corinthian Timoleon, were quite able to cope with the mercenaries of the republic. Timoleon obtained a great victory in 345, which was followed by peace. The Syracusan war for supremacy in Sicily was renewed with the tyrant Agathocles, who, beaten at home, carried the war into Africa in 310. The Mamertines of Messana, a body of Oscan mercenaries who had served Agathocles, invited C. to assist them against Hiero of Syracuse, but shortly after (264) went over to Rome, and then began the first Punic War (264–241), which Michelet has described as the decisive struggle between the Indo-Germanic and the Semitic races. The successes of Claudius at Agrigentum, of Duilius at Mylæ (the earliest naval victory of the Romans), of Regulus at Ecnomus, were followed by the defeat of Regulus by Xanthippus in Africa, the victories of Hamilcar Barca in Sicily, and the final defeat of Hanno at Ægates Insulæ, which led to the evacuation of Sicily by C. A great revolt of the mercenaries of the maritime republic followed, in the course of which Sardinia and Corsica fell a prey to Rome. During the next twenty years, the conquests of Hamilcar in Spain, and of Marcellus over the Gauls and Ligurians, brought the two great enemies to closer quarters. Hasdrubal founded New C. In 219 Hannibal took Saguntum. This act, affirmed by the Romans to be in violation of treaty engagements, was adopted at C., and led to the second Punic War (218–202), which, after Hannibal's long occupation of Italy, and the campaigns of Scipio in Spain and Africa, resulted in the disgraceful conditions of peace that C. was to retain territory in Africa only, to give up all her 'long ships' except ten, to make war only with consent of the Romans, and to restore to Massinissa all that he or his ancestors ever had. After this peace, Hannibal (who lived till 183) became practically tyrant of C. He destroyed the oligarchy of the judges, by a rigorous finance liquidated the war indemnity payable to the Romans, and encouraged trade by the introduction of the olive from Italy. Massinissa, however, proved an untiring enemy, and the encouragement given to him by the Romans led to the third Punic War (149–146). In C. itself there were three parties: the Roman, the Numidian, and the Patriots. Their dissensions, and the treasonable surrender of Utica, led to the destruction of C. by Scipio Æmilianus, in accordance with the decree of the Roman Senate: 'They shall reside more than three leagues from the sea, and their city shall be entirely destroyed.' The new colony of C., begun by the Gracchi about B.C. 116, and completed by Augustus, does not figure largely in the history of the empire. In A.D. 429, Colonia C., then the mistress of a territory extending along the Mediterranean a journey of ninety days, was taken by Genseric the Vandal, and made the basis of his naval operations against Italy. Belisarius established the power of Justinian and expelled the Arians. The city was destroyed (A.D. 692–698) by Hassan, Governor of Egypt, under the Calif Abdamaleh. Two centuries later the first of the Fatimite caliphs repeopled it. In the beginning of the 16th c., C. consisted of 'a mosque, a college without students, twenty-five or thirty shops, and the huts of 500 peasants.' Nothing is seen now but ruins, a few cisterns, and vaults.

At C. the great interests were those of trade, and accordingly the Senate consisted of wealthy men and those distinguished in the public service, chosen for life. Much more influential was the Gerusia, or Council of the Hundred, which apparently consisted of selected senators, who acted as chief magistrates, were guardians of public morality, and were elected without salary by the Pentarchies, permanent committees of the Senate. At the head of the executive were the Suffetes, two in number, who presided in the Senate and initiated business there. Occasionally, on great political issues, a plebiscite was taken.

Ecclesiastical History.—In 397 a Church Council was held at C., which directed that nothing but bread and wine mixed with water should be used in the Eucharist, that priests standing at the altar should pray only to the Father, that baptism and the Eucharist should not be given to the dead, and that the canonical Scriptures should include Tobit, Judith, Wisdom, Ecclesiasticus, and Maccabees. To the following year belong the African rules for ordination and consecration (partly embodied in the Gelasian Sacramentary). It is also laid down that while bishops are to avoid secular business, clergy who can work are to earn their bread by trade or tillage. Laymen, but not women, may preach with the priest's permission. In 411 a great conference of Catholic and Donatist bishops decreed the suppression of Donatist conventicles, the restoration of their churches to the Catholics, the banishment of their clergy, and the infliction of fines, stripes, and civil disabilities on all classes of Donatists, from the Illustres to the Circumcellions. Soon after, the great Pelagian heresy was preached at C. by Cælestius. The 'impious and wicked proposition' that man could live without sin, and easily keep God's commandments, called forth many fiery sermons and treatises from Augustine, and was formally condemned at C. in 416, and again at a great council of the African Church held 1st May 418, which insisted on the transmission of guilt from Adam, and on the absolute necessity of baptism in the case of infants.

Carthage, Cape, a headland of N. Africa, a little to the N. of the entrance to the Lagoon of Tunis. Near it are to be seen traces of the ancient city of Carthage (q. v.).

Carthage'na Bark. See CINCHONA.

Cartha'go, the former capital of Costa Rica, Central America, lies at the foot of the volcano Pazu, near the mouth of a small river of the same name, 10 miles E. of San-José. It is one of the oldest Spanish towns of Central America, and was almost entirely destroyed by an earthquake, September 2, 1842. Pop. 7000. C. is also the name of a deep bay on the N.W. of the Mosquito shore.

Car'thamine, or Carthameine. See CARTHAMUS.

Car'thamus, a genus of plants of the natural order *Compositæ* (sub-order *Tubulifloræ*). *C. tinctorius* is the bastard saffron

or safflower, the *Koosumbha* of India, extensively cultivated in India, China, and other parts of Asia, for the sake of the pink dye which is extracted from the florets. Among other articles, the *pink saucers* are coloured by it. About £106,000 worth are annually imported into this country from India. It is also employed to adulterate *rouge* and hay saffron. *Cake saffron* is prepared from it and mucilage. From the fruits, commonly called *the seeds*, is expressed the *koosum oil* of India. A similar oil is expressed from *C. persicus*. The dye obtained from *C. tinctorius* is called *carthamine*. It attaches itself to silk or cotton, but not to wool, and requires no mordant. The red colour which it gives can be changed to yellow by the addition of alkalies, but may be returned to its original colour again by being treated with acids.

Carthu'sians, a religious order instituted by St Bruno in 1086, and named from La Chartreuse, near Grenoble, Vienne, whither the saint retired with six companions to spend a life of pious solitude and austere severity. The oldest Carthusian 'rule' is that drawn up by Prior Guigo in 1134, and entitled *Consuetudines Cartusiæ*. The order was sanctioned by the Pope in 1170, and in 1180–81 spread into England, where nine houses were established, the most famous of which was the Charter-House (a corruption of Chartreuse House) in London. The 'rule' is extremely rigorous. In addition to the usual monastic vows, there is one of unbroken silence, the violation of which, except on particular days, is visited with scourging. The C. have still two of the finest convents in the world, viz., *La Grande Chartreuse*, on the site of their original home in the desolate valley near Grenoble, and *Certosa*, near Pavia. An establishment for Carthusian nuns was founded at Salette, on the Rhone, about 1229, the 'rule' of which is substantially the same as that for the monks.

Car'tilage. This substance is what is commonly known as *gristle*. It may be found in two situations—either covering the extremities of bones entering into the formation of joints (articular C.), or strengthening the walls of cavities (membranous C.). C. is also sometimes divided into *temporary* and *permanent*. It is temporary, as found in fœtal life, when there exists a cartilaginous skeleton, which is gradually supplanted by a harder and stronger structure—bone. (See BONE.) It is permanent when it exists as C. throughout life. C. consists essentially of cells imbedded in a substance called the matrix, and the varieties of C. differ from each other in the proportion of cells to matrix, and in the structural characters of the matrix. Thus there may be no matrix, when the C. is termed *cellular*; or the matrix between the cells may present a finely molecular appearance, when the structure is known as *hyaline* C.; or the matrix may have been transformed into fibres, when it is termed *fibro* C. In all the varieties of C. the cells present much the same appearance. We shall therefore now describe (1) typical C. cells; and (2) the different varieties of the tissue as found in the human body.

I. *Cartilage Cells.*—These may be readily seen by cutting a thin section of C. from the end of a long bone, and examining it under a magnifying power of 250 diameters. They are found to be round, oval, or more commonly irregularly crescentic in form, and flattened. They vary in size, the average diameter being about the $\frac{1}{1000}$ of an inch. They have no cell-wall, and they appear to be composed of a delicately granular protoplasm, having imbedded in it usually one, sometimes two, small nuclei. During life these cells may be caused to contract by mechanical irritation or electrical discharges, and heating up to 200° F. causes the protoplasm to become cloudy and sometimes granular. Frequently groups of cartilages are seen surrounded by a kind of halo or capsule. This, however, is not a true capsule, but is due to the fact of the matrix surrounding the group of cells being more granular than at other parts, and also to the shrinking of the cells from the matrix. Water produces no evident effect on C. cells. Weak acetic acid renders young C. cells more transparent, but has no effect on old ones. Colouring matter stains the protoplasm of the cell, the nucleus more deeply affecting the matrix slightly, or not at all. The cells frequently contain molecules of fat. C. cells multiply by endogenous formation—that is, by two or more young cells forming within the parent cell, which afterwards ruptures and liberates the progeny—or by simple fusion or division.

II. *Varieties of Cartilage.*—These are: 1. *Hyaline C.*—This variety forms the framework of the skeleton in the fœtus. The cartilaginous skeleton is in course of time replaced by bone, but in the adult, hyaline C. covers the ends of the bones forming the joints, and it also remains persistent in the C. of the nose and of the larynx. The C. of the rings of the windpipe and bronchial tubes also belongs to this variety. In very young hyaline C., the matrix is delicately molecular and translucent, but in specimens from old subjects it is roughly molecular, resembling ground glass. The cells lie in this matrix usually in an irregular manner. In articular C., however, the cells follow a regular arrangement. Thus, if a thin perpendicular section be made on the end of a long bone, such as the femur, it will be found that near the free surface of the C. the cells are placed so that their long axis is parallel with the surface; deeper down, they are arranged in groups irregularly, while near the bone they are found in long rows, perpendicular to the surface of the bone. In old hyaline C. the matrix is often traversed by pale yellow fibres. The C. found at the ends of the ribs, near the breastbone, is a variety of hyaline C., and has the peculiarity of having the ossific centre in the centre of the transverse section, from which rows of cells pass in a radiating manner.

2. *Fibro-Cartilage.*—As the name indicates, this variety has the matrix composed of fibres. There are two kinds—(*a*) *white fibro-C.*, in which the matrix consists of ordinary white fibrous tissue, rendered transparent and gelatinous by the action of dilute acetic acid; and (*b*) *yellow fibro-C.*, where the matrix is composed of yellow elastic tissue, not affected by the same re-agent. The first kind is found in the discs between the vertebræ forming the backbone, and the second exists in the epiglottis, the cartilages of *Wrisberg* and *Santorini* in the larynx, and in the Eustachian tube and external ear.

We have now to describe the physical and chemical characters of C.

Physical Characters.—It is firm, dense, and of a whitish or yellowish colour. Thin sections show a considerable amount of elasticity and flexibility, but thick pieces are brittle. It does not macerate readily in water. Fibro-C. is remarkably tough, and difficult to cut into thin sections or to tease out by needles.

Chemical Characters.—When C. is boiled from 12 to 48 hours, it dissolves and yields Chondrin (q. v.). Microscopical examination shows that by this process the matrix is alone dissolved, not the cells. The inference is, therefore, that the cells do not yield chondrin, but have a chemical constitution different from the matrix. Yellow fibro-C., after digestion in caustic potash for several days, followed by boiling for sixty hours, yields a jelly-like brittle substance, which breaks down into granules. These granules may be dissolved on the addition of water, and are composed of a substance termed elastin. White fibro-C. yields gelatine on boiling. Water exists in C. to the extent of from 54 to 70 per cent The ash of C. yields phosphates of calcium and magnesium, chloride of sodium, carbonate of soda, and sulphates of soda and potash. The amount of ash varies from 2 to 6 per cent. The proportion of inorganic constituents is increased by age. Thus, according to Von Bibra, costal cartilages yielded as follows:—

A child of six months	. .	2·24 per cent of ash.	
A child of three years	. .	3·00	,, ,,
A girl of nineteen years	. .	7·29	,, ,,
A man of forty years	. .	6·10	,, ,,

C. is covered by a fibrous membrane termed the *perichondrium*. From this a few vessels penetrate into the tissue to a slight depth, but C. is, strictly speaking, a non-vascular tissue. C. is not supplied, so far as is known, by nerves or lymphatics.

Pathological Changes in Cartilage.—As shown by Redfern and by Virchow, C. subjected to irritation shows the following changes: segmentation of the cells; softening of the matrix; transformation of the matrix into fibrous structures; calcification or transformation of the whole into a material resembling connective tissue. C. once destroyed is never regenerated, and the gap made by a section is closed by connective tissue. Occasionally new C. is formed, and may form a tumour attached to the end of a bone (*ekchondrosis*), or new C. may originate where the structure does not normally exist, as in glandular textures. A tumour may thus be formed called an *Enchondroma*.

Cartilag'inous Fishes, the name applied to those fishes the skeletons of which consist of Cartilage (q. v.) or gristle, and which thus exhibit a lower degree of structure in this respect than the true bony or *Teleostean* fishes. Cuvier constituted this group under the name *Chondropterygidæ*, and in this division he included a number of fishes which in modern zoological systems are divided among two or three distinct orders, being separated by differences and analogies more important than those of the skeleton alone. Thus the Ganoid fishes, or *Ganoidei* (q. v.), including the sturgeons, bony pikes, polypteri, &c., and the *Elasmobranchii*, represented by sharks, skates, rays, &c., form two chief sections which include fishes with gristly skeletons. But there are some few other forms or groups included by important structural affinities with the *Teleostean* osseous or bony fishes, in which the skeleton is cartilaginous. The Lancelet (q. v.), the Lampreys (q. v.), and Hag-fishes (q. v.), and even some of the osseous fishes (*e.g.*, *Plectognathi* and *Lophobranchii*), possess either cartilaginous or imperfectly ossified skeletons. The order *Teleostei* of modern ichthyology comprehends, in chief, the osseous fishes of Cuvier.

Cartoon' (Ital. *cartone*, pasteboard or large paper, from *carta*, Lat. *charta*, 'paper'), a full-size design or study sketched upon strong paper, in chalks or in distemper, for a work afterwards to be executed in fresco, oil-colour, or tapestry. From the C. the design is transferred to the canvas or the plaster upon which it is to be elaborated, by the usual process of tracing the lines of the design with a sharp point—a sheet of prepared black paper having been previously introduced between the C. and the canvas. When the design is for a fresco—in which case the plaster is worked wet, and, consequently, only a small part of the work is proceeded with at once—the design is transferred either by tracing or by pricking through the lines. By making use of the finished C. the composition, drawing, expression, and light and shade are all perfectly expressed before any colour is laid on, and the chief advantage of its use is, that after the complete design has been transferred, the mind of the artist, free from other distractions, is now concerned with the quality and effect of colour alone. The finest cartoons known are those executed by Raphael for Leo X. in 1515 and 1516 as patterns for tapestry. Each C. is about 12 feet high, is drawn with chalk upon strong paper, and coloured in distemper by Raphael and his pupils. They were originally ten in number; but, in the course of many vicissitudes, three, the 'Stoning of St Stephen,' 'Conversion of St Paul,' and 'St Paul in his Dungeon at Philippi,' have been lost. The remaining seven, illustrative of acts in the lives of the apostles, are now in the South Kensington Museum, and are consequently freely accessible to the public. These great works were bought in Flanders by Reubens for Charles I., and we owe their preservation to Cromwell, who, at the dispersion of the collection of Charles I., caused them to be bought for the country. They are considered to be, as designs, the very finest of Raphael's works, and a careful study of them is in itself an art education.

Cartouch' (Fr. *cartouche*, 'a cartridge,' introduced in the 16th c. from Ital. *cartoccio*), in military language, has had several meanings—a wooden case filled with cannon-balls, a cartridge, a cartridge-box, and also a soldier's ticket-of-leave.

In architecture, C. means a tablet for ornament or to receive an inscription, formed like a sheet of paper with the edges rolled up, like a Modillion (q. v.). The word is applied also to an elliptical oval on ancient Egyptian monuments and in papyri, on which are hieroglyphic characters expressing the names and titles of kings.

Car'tridge, a cylindrical case containing a part, or the component parts, of a charge for firearms. The former consists of gunpowder only, and is called *blank-cartridge*, while the latter includes the full charge for the weapon—viz., for a rifle or ball-gun, powder, lubrication (in the shape of a wad or otherwise), and bullet; and for a fowling-piece, powder, wads, and small shot. Cartridges for cannon contain powder only, cased in a bag of flannel or serge, and, for the larger bores of cannon, bound with iron hoops.

When muzzle-loading small-arms were in use, the C. employed for military purposes was a paper tube containing the powder and bullet (for blank-C. the powder only); and for fowling-pieces, a paper case containing the small shot, the interstices being filled with bone-dust, and for long-range shooting having a wire-netting of greater or less strength, according to the range required, surrounding the outside of the case.

Cartridges for breech-loading small-arms are very numerous, but they have all so much in common, that a description of one or two will give a good idea of their general construction. For military arms, the best type of C. is believed to be the Boxer-Henry, adopted by the British Government for the Martini-Henry rifle. The case is the invention of Colonel Boxer, late superintendent of the Royal Laboratory at Woolwich, and the bullet and lubrication that of Mr Henry of Edinburgh. A section of this C. is shown at fig. 1. The case, *a a* (which is bottle-

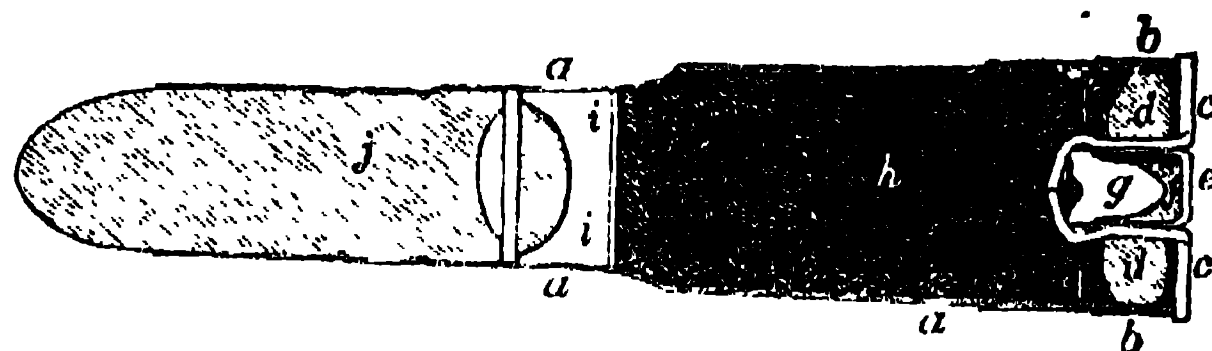


Fig 1.

shaped), is made of coiled brass, with a strengthening cup, *b*, of the same material at the back end, the base being an iron disc, *c*, with a hole in the centre: this base has a projecting flange for the extractor of the rifle to take hold of, for the purpose of withdrawing the C. from the chamber. The rear end of the C. is further strengthened by a thick disc, *d*, of paper pulp inside the metal case. In the centre of this disc is a small brass chamber, *e* (the cap-chamber), the forward end of which is embedded in the pulp, while its rear end protrudes through and is riveted down on the iron base, which it keeps in position. The cap *f*, containing the detonating powder and the anvil *g*, is contained within the chamber. The charge consists of the powder *h*, the lubricating wad *i*, of pure beeswax between thin wads of jute, and the bullet *j* enveloped in a paper wrapper, the bullet being secured into the case by two cannelures. The ignition is effected by the piston or striker of the rifle impinging on the base of the cap and driving the latter against the anvil. the concussion ignites the detonating powder in the cap, and the flash passing through the small hole in front of the cap-chamber, communicates with the powder.

Fig. 2 is a section of a central-fire cartridge for a shot-gun. The case, *aa*, is a cylinder of thick paper with a brass cup, *bb*, forming the base, strengthened, as in the former case, by a disc of paper pulp, and sometimes, for additional strength, having a short coil of thin metal inside the paper. The arrangement for

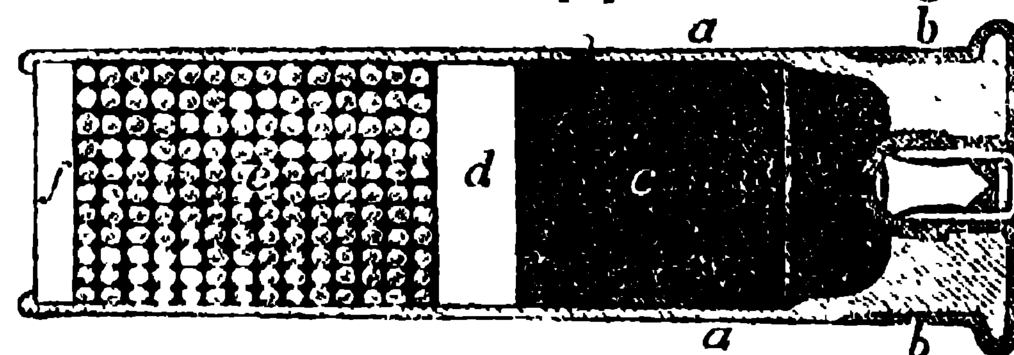


Fig. 2.

ignition is the same as in the Boxer-Henry cartridge; *c* is the powder, *d* a thick felt wad, *e* the shot, and *f* a thin felt wad over the shot.

In addition to being made of coiled brass and paper, C. cases are also made of solid drawn brass or copper, and in addition to the central-fire arrangement for ignition, there is also the rim-fire and pin-fire. In the former, the rim of the base is hollow, and contains fulminate all round it; a blow of the hammer or striker on any part of the rim causes the ignition. In the latter, the cap is situated in the centre of the pulp, with its mouth towards the edge of the case, and a pin passes through the side of the case and into the cap, the ignition being caused by the blow of the hammer on the pin, which protrudes through a small hole in the breech end of the barrel of the gun.

Cartridge-Paper is white, strong in texture, with a rough surface, and is used for drawing and various purposes in the arts. It derives its name from the circumstance of having been originally manufactured for military cartridges.

Cart'wright, Edmund, the inventor of the power-loom, was born at Marnham, Notts, on 24th April 1743, and educated at Oxford, where he obtained a fellowship, for the English Church,

in which he held a living for many years. He does not appear to have shown any special turn for mechanics, and it was not until he was over forty that a chance conversation turned his attention to the then unsolved problem of machine-weaving, with such excellent result that less than a year afterwards he was able to exhibit his first Power-Loom (q. v.). It was at first a very imperfect machine, and its introduction was fanatically opposed by both millowners and workers, a mob setting fire to the first factory. After making many improvements in it, C.'s persevering efforts to get it introduced into mills were successful, and public opinion so altered itself that in 1809 Parliament voted him £10,000 in acknowledgment of the value of his inventions —a grant which enabled him to end his days in comfort. He died 30th October 1823. See *Life and Correspondence of C.*, by his niece (2 vols. Lond. 1826).

Cartwright, Thomas, a distinguished divine and scholar, was born in Hertfordshire about 1535, and was educated at St John's and Trinity Colleges, Cambridge. As a preacher he was much admired, but being strongly Puritan in his principles, he was frequently persecuted by Whitgift and others, was more than once imprisoned, and was compelled to reside for the most of his life abroad. We find him at Geneva in 1570, at Heidelberg in 1573, later at Antwerp and Middelburg, and at Guernsey in 1595-98. He died at Warwick, 27th December 1603, his death having been, it is believed, hastened by his troubles. C. was ecclesiastically a factious and mutinous spirit. He had a morbid passion for controversy, and did everything in his power to provoke persecution. Among his writings, of which a long list is given in Cooper's *Athenæ Cantabrigienses*, are a *Latin Harmony of the Gospels*, a *Commentary on the Proverbs*, and a *Confutation of the Rhemists' Translation, Glosses, and Annotations on the New Testament*, &c.

Carus, Karl Gustav, a German physician, was born at Leipsic, 3d January 1789, and studied at the university there Elected Professor of Clinical Obstetrics at Dresden in 1814, he became physician in ordinary to the King of Saxony in 1827, and died at Dresden, 28th July 1869. His chief works are *Lehrbuch der Zootomie* (Leips. 1818; 2d ed. 1834); *Grundzüge zur vergleichenden Anatomie und Physiologie* (3 vols. Dresd. 1828); *Atlas der Kranioskopie* (Leips. 1843; 2d ed. 1864); *Zur Entwickelungsgeschichte der Seele* (Pforzh. 1846; 3d ed. 1860); and *Briefe über Landschaftsmalerei* (1834). His *Lebenserinnerungen* (4 vols. 1865-66) are full of interest.—**Julius Victor C.,** a well-known German anatomist and zoologist, was born at Leipsic, August 25, 1823. After acting for a time as conservator of the Oxford Anatomical Museum, he was elected Professor of Comparative Anatomy in his native town in 1853. He lectured in Edinburgh University in the room of Professor Wyville Thomson, who was absent on the *Challenger* expedition, during the summers of 1873-74. He is a strong Darwinian, pushing the claims of natural selection even further than its great originator. His chief works are *System der thier. Morphologie* (Leips. 1853); *Icones Zootomicæ* (Leips. 1857); *Bibliotheca Zoologica*, with Engelmann (2 vols. Leips. 1862); *Handbuch der Zoologie* (1868); and with Gerstacker, *Geschichte der Zoologie* (Munich 1878).

Car'vel-Built, in ships and boat-building, is a term signifying that the outer planks are all smooth, meeting edge to edge. In iron ships this arrangement is called *jump-jointed.* See CLINCHER-BUILT.

Car'ver, John, the first governor of the Plymouth colony in the New World, was born in England in the second half of the 16th c., and went to Leyden, then a refuge for the Puritans. He was an elder in the Church, and in 1620 sailed with the Pilgrims in the *Mayflower.* C. was a prudent and firm ruler, but did not long survive his arrival in New England, dying at Plymouth, April 5, 1621.

Carvin, a town of France, in the department of Pas-de-Calais, about 15 miles N.N.E. of Corras. Pop. (1872) 5780, engaged chiefly in the manufacture of alcohol from beet-root.

Car'ving is the art of producing decorative work upon hard surfaces with the aid of sharp tools; the name, however, is generally used, in a limited sense, to denote works in ivory, bone, and wood, in contradistinction to *sculpture* in stone and *chasing* in metal. All nations practise in some degree the art of C., and the skill and ingenuity shown by savage tribes in wood-C. is wonderful. The intricate designs which the uncivilised Maori wrought with extremely rude tools upon his house, canoe, weapons of war, &c., are truly remarkable. Wood has been used from the earliest times for C., and the *chryselephantine* sculpture of the greatest artists of ancient Greece points to the extensive use of ivory in works of art. The statue of Minerva, executed in gold and ivory by Phidias, which was placed in the temple of that goddess at Athens, is supposed to have stood over 39 feet in height. The Chinese and Japanese are extremely adroit in C. in ivory, and the French and Italians in decorative woodwork. Machinery has of late years been successfully applied to the cheap and expeditious production of wood-carvings; those of the interior of the Houses of Parliament having been so produced. The woods chiefly employed in C. are the pear, lime, American pine, chestnut, maple, oak, box, ebony, snakewood, and tulipwood.

Ca'ry, Rev. Henry Francis, was born at Birmingham in 1772. He distinguished himself at Oxford by his knowledge of languages, and in 1797 became vicar of Bromley Abbots, Staffordshire. In 1805 appeared his translation of Dante's *Inferno*, and in 1814 a version of the entire *Divina Comedia*, which is admirable for its accuracy and vigour. From 1826-32 he was assistant librarian in the British Museum. He died 14th August 1844. C. also wrote translations of the *Birds* of Aristophanes, and the *Odes* of Pindar, Lives of English and French poets, and published editions of Milton, Pope, Cowper, Thomson, and Young. See the Memoir by his son (1847).

Cary, Sir Robert, a nobleman eminent in the civil service of Queen Elizabeth, was a son of Henry Cary, Lord Hunsdon, and was born about 1560. On her death in 1603, C. rode swiftly to Edinburgh to acquaint James VI. with the intelligence. He was created Earl of Monmouth at the coronation of Charles I., and died in 1639. His curious and interesting *Memoirs* were published in 1759, from an MS. in the possession of the Earl of Cork and Orrery, and again in 1808 (Edinb.).—His son, **Henry C.,** second Earl of Monmouth (born 1596, died 1661), was an industrious author. His writings are chiefly translations from Italian and French authors, and are not remembered.

Car'ya, a genus of plants belonging to the natural order *Juglandaceæ* (walnut order). *C. alba* is the common Hickory (q. v.); *C. olivæformis*, the peccan nuts; *C. porcina*, the pig or hog nut. The nuts are consumed by pigs, squirrels, &c., and the wood is considered superior to that of the rest of the genus.

Caryat'ides (lit. the women of Caryæ in Laconia, and especially the priestesses of Artemis there), is the name given in architecture to female figures used instead of columns to support a cornice. Vitruvius explains its origin thus:—After the battle of Thermopylæ, the inhabitants of Caryæ, having joined the Persians, were attacked by the allied Greeks, the males slaughtered, and the females carried into captivity. Male figures, used as bearing-shafts, were represented as Persians, and known as *Atlantes* and *Telamones*; female figures so used were designated C., to commemorate the disgrace of the people of Caryæ.

Caryo'car, a genus of plants of the natural order *Rhizobolaceæ* (q. v.), *C. butyrosum* (*Pekea butyrosa*, or *tuberculosa*), or, according to some, *C. nuciferum*—also a British Guianean tree—is a tree much esteemed in S. America for shipbuilding. The separated portions of the fruit constitute the Sourari, Suratiwa, or Suwarrow nuts of commerce, which form a pleasant article of food. A table-oil is extracted from them. From *C. Brasiliense* a concrete oil can also be obtained.

Caryodaph'ne, a Javanese plant, belonging to the Laurel family. *C. densiflora* has a bitter bark; its leaves are aromatic, and used in spasms of the bowels and similar complaints.

Caryophylla'ceæ, a natural order of dicotyledonous plants, of the subdivision *Thalamifloræ*, containing about 1100 species and sixty genera, chiefly natives of temperate and cold climates; if found within the tropics, they are generally on the sides of mountains, near the limits of perpetual snow. The C. are always insipid, and contain few species of importance. Some are eaten by small animals, and are said to increase the secretion of the milk of cows fed on them. This idea is perpetuated in the name of *Vaccaria vulgaris*. *Saponaria officinalis* contains a principle

called *Saponine*, and has been used in syphilis. The Pinks (q. v.), such as sweet-william, Carnations (q. v.), *Silene*, *Lychnis*, &c., are among the showy garden plants belonging to this order. Chickweed (*Stellaria*), cornspurry (*Spergula arvensis*), &c., are used as fodder for cattle. The order is divided into three sub-orders—(1) *Sileneæ*, the pink tribe; (2) *Alsineæ*, the chickweed tribe; (3) *Mollugineæ*, the carpetweed tribe.

Caryophyll'us, a genus of plants of the natural order *Myrtaceæ*. *C. aromaticus* is the clove-tree, the dried flower-buds of which are known by the name of *cloves*. They possess aromatic, stimulant, and carminative properties, chiefly due to the presence of a volatile oil. The unripe fruits, called *mother cloves*, though much inferior to the ordinary cloves, are used as a spice in China, and are sometimes imported into this country. The buds are collected either by hand or by beating the bushes with a stick, when, owing to their jointed stalks, they readily fall off and are collected on a sheet spread beneath. The clove is now cultivated in the W. Indies, Mauritius, Sumatra, and elsewhere; but for many years its cultivation was restricted by the Dutch to the island of Amboyna in the Malay Archipelago, and the monopoly was even narrowed by the Batavian Government extirpating the trees in every other place except a limited district of the island mentioned. Cloves are used to lull the pain in toothache, and as a carminative in medicine to check nausea and griping caused by the administration of purgatives.

The wild clove-tree of the W. Indies belongs to the same order. See MYRICA.

Caryo'ta, a genus of palms, of which nine species are known, all natives of India and the Indian islands. *C. urens* (or jaggery palm) has a fruit about the size of nutmegs, with a very acrid rhind, and the pulp of which produces a burning sensation when applied to the skin; hence the name *urens* (burning). The natives of Ceylon, Malabar, Bengal, Assam, and other parts of India where it is found, extract from its flowering stalks the juice called 'toddy,' which when boiled yields jaggery or palm-sugar, and also sugar-candy. In the hot season as much as 100 pints will flow in twenty-four hours. In the soft central portion of the trunks of old trees is stored a quantity of starch, which forms excellent sago, which, when made into bread, forms a large portion of the food of the natives. The outer part of the stem is hard, and applicable to many purposes, *e.g.*, the fibres of the leaf-stalk (kittul fibre) into cordage, the leaf-stalk into fishing-rods, the woolly substance at the base of the leaves for caulking boats, &c. The whole of the sugar used in Ceylon is extracted from this palm and two others (*Cocos nucifera* and *Borassus flabelliformis*). The caste of natives called *Jaggeraros* are wholly employed in preparing it.

Casacalen'da (ancient *Calela*), a town of Central Italy, province of Molise, 16 miles N.E. of Campobasso. Pop. about 6000. Silkworms are reared in the neighbourhood, which also yields good wine.

Casa'le, a town of N. Italy, province of Alessandria, on the river Po, 43 miles S.W. of Milan. Its cathedral, the splendid marble chapel of which was completed in 1808, dates from 1474. The citadel, still one of the strongest fortifications in Italy, was built in 1590 by the Duke of Montferrat, of whose duchy C. was the capital. It is the seat of a bishop, and has a considerable industry in silk manufacture. Pop. (1871) 27,514. In the 17th c., C. was several times besieged by the Spaniards, and was captured by them in 1652. It finally fell to Savoy in 1706. The district is rich in corn and wine.

Casal'-Maggio're, a town of N. Italy, province of Cremona, on the Po, 21 miles S.W. of Mantua. Strong embankments protect it from river inundations. Pop. 15,317, largely engaged in the manufacture of earthenware, glass, &c.

Casal'-Pusterlen'go, a town of N. Italy, province of Milan, on a small tributary of the Po, 18 miles W.N.W. of Cremona, and celebrated for its fine Parmesan cheese. The chief industries are silk, linen, and earthenware manufacture. Pop. 6000.

Casamass'ima, a town of S. Italy, province of Bari, 12 miles S. of the town of Bari; has a convent and two abbeys. Pop. 5600. The neighbourhood yields good wine.

Casano'va, Francois, painter and engraver, born in London, of Venetian parents, in 1727 or 1732; went at an early age to Florence, thence to Paris, and afterwards to Dresden. He died at Brühl, near Vienna, 8th July 1815. C.'s works are chiefly battle-pieces, remarkable for spirit and for excellent colour. He painted the battles of Fribourg and Lens for the Prince of Condi in 1771; and later he removed to Vienna, and was employed by the Empress Catherine to commemorate her victories over the Turks.—**Giovanni Jacopo C. de Seingault**, brother of the preceding, was born at Venice, 2d April 1725. His family was of Spanish extraction. He was educated for the Church, but spent his life in amours, intrigues, and peregrinations through Europe, mingling with the highest society, and invariably quitting it in disgrace. Yet his last years were spent in peace at the Castle of Dux, in Bohemia, where he pursued cabalistic 'science' along with his host, Count Waldstein, and where he died, 4th June 1798. It was at Dux that C. wrote those *Mémoires* which give an entertaining account of his vagrant existence, and a valuable picture of his times. They were first published at Leipsic in 12 vols. (1826–38), under the title *Mémoires Écrites par lui-même* (new ed. 6 vols. Par. 1860).

Casau'bon, Isaac, a great French scholar, was born February 18, 1559, at Geneva, of a family belonging to Dauphiné. There he studied languages, theology, and law, and became Professor of Greek in his twenty-fourth year. He married the daughter of the celebrated scholar Henri Estienne in 1586, and continued at Geneva, issuing editions of Greek and Latin authors, until 1596, when he received the Greek professorship at Montpellier. Two years afterwards he visited Paris, where he was appointed royal librarian. On the murder of Henri IV. in 1610, he visited England, where he found an Anglo-Catholic party in closer unison with his views than any Continental school of theology. The story that he was hired by James I. to write against Baronius is a fabrication of the Jesuits. He received two benefices in England, and after his death at London, July 1, 1614, was buried in Westminster Abbey. His theological works are now of slight value, but are singularly placid and tolerant. His learning was vast and recondite; as a commentator he displays rare erudition and candour, and enlivens his annotations by quaint, entertaining gossip. His best works are his edition of *Athenæus*, which occupied him two years, and his edition of *Polybius*. He commented on Aristotle, Diogenes, Laertius, Dionysius of Halicarnassus, Theophrastus, Theocritus, Persius, Pliny the Younger, Strabo, Suetonius, &c., and wrote a treatise on Greek and Roman satire. See *Isaac C.*, by Mark Pattison (Longman & Co. 1875).—**Meric C.**, theologian and critic, son of the above, was born at Geneva, August 14, 1599. After studying at Sedan Academy, he accompanied his father to England, became rector of Ickam and Professor of Theology at Oxford, where he died, July 14, 1671. Like his father, he possessed great learning. His commentaries on Terence, Epictetus, Florus, Diogenes Laertius, and Marcus Aurelius, are of considerable value. He also wrote in defence of his father *Pietas contra maledicos patrii nominis et religionis hostes* (Lond. 1651), and *Vindicatio patris adversus impostores* (1624). See Anthony Wood's *Athenæ Oxonienses* (Oxford, 1694).

Cas'bin, or **Kasvin**, a town in Irak-Ajemi, Persia, 97 miles W.N.W. of Teheran, lies in a fine plain, is defended by walls and towers, and embowered among gardens and vineyards. It has two large mosques, one of which has a high dome, and two minarets of glazed blue bricks. The manufactures include velvets, brocades, weapons, and coarse cottons. There is a large trade, chiefly to the Caspian shores, in vitriol, grain, dried fruits, vine treacle, sheep, and horses. Pop. 25,000, mostly descended from the Turkish nomads that have long frequented the neighbouring plains. C. was capital of Persia for a time.

Cascarill'a (*i.e.*, 'little bark'), the name given in Spanish America to the bitter medicinal barks, like cinchona, which are collected for export. *Cortex cascarillæ* is the bark of *Croton Eluteria* (see CROTON), which is sometimes employed as a substitute for cinchona, especially in Germany. *C.* is also applied by Weddel and other botanists to a sub-division of the genus *Cinchona*, distinguished, *inter alia*, by not containing any of the ingredients that render that bark so valuable.

Case, in grammar. See DECLENSION.

Case, in law, is a formal written argument on the merits of a cause. In England, Scotland, and Ireland, questions in dispute can now be stated and the opinion of court got on them without pleading.

Case, in the art of printing, a shallow drawer, 34 inches long by 15 inches broad, divided into compartments for holding the various letters or 'types' used by the compositor. These compartments are technically called 'boxes,' and vary in size according to the requirements of the English language—the letter *e* requiring the largest box, and others in proportion. The letters are not placed alphabetically, but those in most use are nearest the compositor. There are two cases, an 'upper' and 'lower'—the former containing the capitals, small capitals, &c., the latter the small letters, punctuation marks, &c. They are placed in a stand or 'frame,' 4 feet high, at which the compositor stands. A 'lower-case' will hold about 30 lbs. of type, equal to two pages of the present work, or 18,500 types.

Casea'ria, a genus of plants of the natural order *Samydaceæ*. *C. ulmifolia* is a native of Brazil, and is highly esteemed in that country as a remedy for snake-bites. The Brazilians make a drink of the juice of the leaves, and also apply them to wounds. Nearly a hundred species, many of which have medicinal properties, are known. *C. esculenta* of India has purgative roots, but other species are poisonous. For example, the resin surrounding the young flowers of *C. resinifera* is used to kill dogs and cats.

Case-Hardening, a metallurgical process for superficially converting wrought-iron into hard steel, seldom exceeding $\frac{1}{16}$ inch in thickness, applied to tools, bolts, &c. This result may be obtained by plunging malleable iron raised to a welding heat into liquid pig-iron, and forging out. It is usually effected, however, by heating the iron with substances producing cyanogen, as ferro-cyanide of potassium, leather parings, or horn, and suddenly quenching in cold water. The *rationale* of the process is that some of the carbon, and perhaps a little of the nitrogen, of these bodies, enter into combination with the iron.

Case'ine is an Albumenoid substance (q. v.) contained in milk in quantities varying from 3 to 17 per cent. A substance either identical with or closely allied to C. is found in peas, beans, and other leguminous seeds, and is called *Legumine*. Like other albumenoids, C. exists both in the soluble and insoluble modification. In fresh milk it is present in the state of solution, but it is readily precipitated as *curd*, by the addition to milk of dilute mineral acids, alcohol, and even acetic acid. C. is also coagulated or rendered insoluble by the action of *Rennet*, the lining membrane of the stomach of the calf; this property is turned to account in the manufacture of Cheese (q. v.). Unlike albumen, C. is not precipitated by boiling its solution, but a thin skin or pellicle forms on the surface. C. is readily soluble in alkalies and alkaline solutions, even after coagulation. It unites with alkalies and alkaline earths, and appears to have properties resembling those of an acid. A mixture of cheese and slaked lime has been employed as a cement for porcelain—the two uniting to form a tenacious and insoluble compound. Dried milk-curd is used in calico-printing, and is known by the name of *Lactarine*: it acts as a mordant, *i.e.*, combines with colouring matters forming insoluble compounds which adhere to the cloth. Milk is sometimes given in cases of poisoning by salts of the metals—these forming insoluble precipitates with the C. C. is by no means nutritious, and is the least easily digested of the albumenoids.

Case'mate (introduced in the 16th c. from the Ital. *casamatta*), in fortification, an arched bomb-proof chamber, constructed as a protection from the effects of vertical and enfilade fire, and adapted for use as barracks, magazine, or hospital, and sometimes for mounting guns, which are fired through embrasures.

Casem'be (*i.e.*, 'general'), the title of a sovereign in the interior of Africa, whose territory, called the country of C., has been made known to Europeans by Dr Livingstone. It is partly upland, and is 'generally covered with forest, well watered by numerous rivulets, and comparatively cold. The soil is very rich, and yields abundantly wherever cultivated.' The chief river is the Luapula, which connects Lakes Bangweolo and Moero, entering the latter about 19 miles N.W. of C.'s town. The climate is in some districts unhealthy. The town of C., near the N. end of the small lake Mofwe, at an elevation of 3319 feet above the level of the sea, consists of huts interspersed among cassava plantations, and covers one sq. mile. Each governor builds a new capital for himself. See the *Last Journals of David Livingstone* (2 vols. Lond. 1874).

Case'ment (Ital. *casamento*), in building, a frame enclosing part of the glazing of a window, and opening on hinges. C. windows are general on the Continent, but rare in this country. In architecture, C. is the old English name for the hollow circular moulding now called a *Scotia*, which in Gothic architecture, especially in the Perpendicular style, is very prevalent in cornices and door and window jambs, and which is sometimes richly carved with running patterns of foliage.

Caserns' (Fr. *caserne*, 'barracks;' introduced from the Sp. *caserne*), huts erected for the temporary accommodation of soldiers on duty in a fortified town. They are put up either on the ramparts, or between the ramparts and the houses.

Caser'ta (Ital. *casa erta*, 'steep or tall house'), the capital of a province of the same name, S. Italy, on a hill, 12 miles N.E. of Naples by railway. It is the seat of a bishop, and has one of the largest and finest castles in Europe, built by Carlo III. in 1752, at a cost of £1,575,000. It is surrounded by magnificent gardens, and gives to the town its name. C. has a royal silk factory. Pop. 27,728. The *province* has an area of 2307 sq. miles, and a pop. (1871) of 697,403.

Case-Shot, or **Canister-Shot**, in ammunition, a cylindrical box of iron or tin-plate, charged with sand, shot, and shavings or sawdust in the interstices. They are used for destroying ships' rigging, in defending ditches or narrow defiles, or employed with terrible destruction against masses of troops at short distances, rarely exceeding 300 yards. C.-S., with wooden bottoms projecting slightly beyond the cylindrical body, are discharged from bronze ordnance on account of the injury inflicted by the iron on the bore of the guns. The diameter of C.-S. ranges from 3 to 10 inches, and the size of the sand-shot employed varies accordingly; for the convenience of lifting, the large C.-S. have an iron or rope handle attached to one end.

Cash (Fr. *caisse*, a 'money-chest'), strictly means only coin and bank-notes, but is sometimes used in a wider sense to denote not only ready-money, but also bills, drafts, bonds, and all the immediately negotiable paper in an individual's possession.

Cash Account. See CREDIT, CASH.

Cash'el (Irish Gael. *caiseal*, 'a circular stone fort'), a town in Tipperary county, Ireland, 9 miles W. of Tipperary, with which it is connected by railway. It is built at the base and on the sides of the famous 'Rock of Cashel,' an isolated limestone hill rising from the plain of the Suir. The rock is crowned with some famous ruins, among which are the old cathedral, founded in 1169, Cormac's Chapel (1127), the palace of the Kings of Munster, and a round tower. Of the modern buildings may be mentioned the new cathedral (Church of St John), the town-hall, the county infirmary, and barracks. The archbishopric of C. was reduced to a bishopric in 1834. C. is also a Roman Catholic archdiocese. The trade is chiefly in agricultural produce, and large markets are held here bi-weekly. Pop. (1871) 4317. C. returns one member to Parliament.

Cash'ew Nut (*Anacardium occidentale*), a tropical tree of both hemispheres (though reputed as originally American), belonging to the natural order *Anacardiaceæ*. The milky juice, used in India for varnishing, is exceedingly acrid. The 'nut' is kidney-shaped, seated on the end of the pear-shaped fleshy stalk, which is the edible portion. The kernel is oily, but very pleasant and wholesome, and in tropical countries is a great favourite for making puddings, &c. It is thought to communicate a peculiarly pleasant flavour to old Madeira and other wines, and accordingly, in the W. Indies, it is frequently put into wine. It is also, for the same reason, mixed with chocolate. The vapour which arises from the coating of the kernel during the roasting operation is so acrid as to cause erysipelas in the face if care is not taken to avoid the fumes. The fleshy stalk (or *C. apple*), is very pleasant to the taste, refreshing, and free from acridity. A large quantity of gum exudes from the

bark, but is also without acridity, and is not unlike gum-arabic, though little known in commerce. The juice of the 'apple' when fermented yields a kind of wine, and in Bombay and other places a spirit is also produced from it.

Cash'gar, or **Kashgar**, also known as Eastern Turkestan, an independent khanate of Central Asia, in the basin of the Tarim, is bounded N. by the Tian-shan Mountains, S. by the Kuen-lun range, E. by the great desert of Gobi, and W. by the Bolar Tagh and Pamir steppes. Estimated area, 400,000 sq. miles, and pop. 850,000. It is a vast undulating waste of bare sand and glaring salt, from 3000 to 4000 feet high, and sloping gradually to the E., in which direction flows the Tarim, to lose itself in Lobnur, an enormous stretch of lagoons and swamps. The glaciers in the lofty frontier mountains send down some twenty large tributaries to the main river. There is, however, but scant vegetation, and almost no animal life, except in the Lob-nur forests and reed belts, where tigers, wild hogs, panthers, and wolves abound. The inhabitants are massed in some thirteen isolated settlements at oases on the river banks or mountain skirts; of these, Yarkand is by far the most populous. Each township is sheltered by willow, poplar, and elm groves, and its gardens produce small quantities of wheat, barley, maize, rice, cotton, flax, hemp, and tobacco. The country is rich in minerals, including gold, silver, lead, copper, iron, coal, jade, &c. Turfan supplies the Kashmiri with the finest wool in the world for the famous shawl manufacture. The climate of C. is one of extremes, the temperature ranging from about 26° F. in winter to 95° F. in summer, while rain is rare; and a regular N.W. wind in spring is usually followed by sand-storms and whirlwinds. C. was an independent Aryan kingdom as early as 200 B.C., and became subject to China about 60 B.C. It was conquered by the Arabs about the middle of the 8th c., and by Genghis Khan in 1220, under whom its cities rose to wealth and importance. Timur overran C. in 1389, and it was again taken in 1760 by the Chinese, who clung to its possession till the Tungani revolt of 1862–63. After a struggle of six years, Yakub Beg, now *Atalik Ghazi* ('Champion of the Faith'), once more converted it into a Mahommedan state.—C., the capital, on the Tuman, is encircled by high and massive walls, and has well-stocked bazaars, but few good buildings. Pop. 80,000, including many large suburbs. See the works of Johnson (1866), Shaw (1871), Hayward (1872), and Bellew (1875).

Cashier'ing (Fr. *casser*, 'to break') is a punishment sometimes inflicted on officers in the army and navy. Its effect is to dismiss the offender from the service, and to disqualify him from re-entering it. C. is commonly awarded on the verdict by a court-martial of 'guilty of scandalous and infamous conduct.' The sentence of simple dismissal commonly follows the verdict of 'guilty of conduct unbecoming the character of an officer and a gentleman.'

Cash'mere, or **Kashmir'**, an independent state in the Himalayas, has an estimated area of 4500 sq. miles, and a pop. of 1,537,000. It mainly consists of the so-called 'Happy Valley,' famous alike for its fertility and its beautiful scenery, while it also includes Jummu, Bulti, Ladakh, Chamba, &c. The valley, from S.E. to N.W., is 118 miles long, about 17 broad, and is some 5200 feet above the sea. It is enclosed by lofty mountains, and watered by the Jhelum, which flows on through the Baramula Pass to the plains of the Punjab. The highest peaks in the Pansal range are Haramuk (16,015 feet), Muli (14,952 feet), and Ahertatopa (13,042). The range is covered with snow for eight months in the year, and between its spurs are many large glaciers. Ten frequented passes lead into the valley, the highest being 12,560 feet; but many others are practicable. The Jhelum, which is formed by the junction of the Arpat, Bring, and Sandraran, is spanned by thirteen rude but durable bridges, and is navigable for 60 miles, from Islamabad to Baramula. The principal lakes are the Wular, through which the Jhelum flows, and the Dal or 'city lake,' to the N.E. of Srinagar. The climate on the mountains is rigorous, in the valley temperate and healthy, while the seasons nearly correspond to those of England. Of forest trees, the chief are the cedar, pine, fir, elm, birch, and maple. Fruit and flowering and medicinal plants are singularly abundant. Three-fourths of the valley is cultivated, the crops being mainly rice, wheat, maize, barley, flax, and various oil grains. Sheep and cattle are numerous, and of wild animals the principal are the bear, leopard, fox, chamois, wolf, and otter. Besides the famous shawls, the manufactures are woollen cloths, leather, papier-maché, gold and silver articles, and weapons. The rearing of the silkworm was made a Government monopoly in 1871. C. exports annually £130,000 worth of shawls, which range in price from £5 to £300. The shawl-weavers are a most degraded class, physically and morally, though the Kashmiris are, generally speaking, a fine race, well built, tall and strong, with olive complexions and regular features. The Maharaja has an army 3200 strong, and a revenue of £843,000. Hindus are the dominant class, but the Mohammedans (chiefly Sunites) are ten times more numerous. The language (*Kashnur*) is a prakrit of pure Sanskrit, and in its written form contains several histories and poems, besides innumerable legends and songs. C. was under alternate Tartar and Hindu rule till 1341, when it first received a Mohammedan king. It was conquered by Akbar in 1586, and betrayed into the power of Afghanistan on the decline of the Mogul Empire in 1752. In 1819 it was subdued by Runjit Singh; and after the Sikhs were crushed by the British in 1845, it was transferred, on payment of £1,000,000, to Gulab Singh, as a sovereign independent of the Sikhs, who is bound to refer to the arbitration of Britain in all disputes. The Jummu dynasty has continued loyal and friendly to the British Government, and rendered valuable services during the Indian mutiny. Runbir Singh, the present ruler, issued an annual administrative report for the first time in 1872.—C., or **Srinagar**, the capital, lies on the Jhelum, about the centre of the valley, is intersected by canals. The houses are built of wood, and are from six to seven stories high. The two great wooden mosques of the Jummah Musjid and Shah Hamedan are declared by Ferguson to be the most perfect specimens of their kind in the world. The special industries of C. are papier-mâché, engraving on stone, and shawl-weaving. Of late years silk-weaving has been begun, and a special *serai* has been constructed for the Tarkand merchants. Pop. 40,000. In 1878 the state and town were ravaged by famine and cholera.

Cashmere or **Cashmir Goat**, a variety of Goat (q. v.) inhabiting Thibet and Central Asia generally. The males have long flattened horns, which curve backwards and outwards in a series of undulating curves. The fur is of double nature, and consists of an inner coat of woolly greyish hair, and an outer one of long silky hairs. The under coat supplies the material from which Cashmere shawls are manufactured; a single shawl a yard and a half square absorbing the outer coat of at least ten goats. The taxed industry, and not the material, causes these shawls to be sold at very high prices. The C. G. will breed with the Angora Goat (q. v.), the hybrid possessing also a fine mixed wool. The hair is spun by females, and then dyed. It is manufactured into the shawl fabric on looms of primitive construction.

Casimir, a French form of the Polish Kazimierz. See POLAND.

Casi'no (Ital. dim. of *casa*, 'a house'), a place for social meetings, having rooms for refreshments, singing, dancing, and other amusements. The C. is of Italian origin, the nobles having private houses for amusement detached from their palaces, and the people imitating them in a building generally close to a theatre. They are numerous also in France and Germany, and are not unknown in England.

Casino, or **Monte Casino**, a mountain in the province of Caserta, S. Italy, 55 miles N.N.W. of Naples. It is well known through a fine old abbey, founded here by St Benedict in 529 A.D. This abbey has a printing-press, from which the monks, who have, as a rule, honourably maintained the great traditions of Benedictine scholarship, have issued various important works. A key to its valuable library and archives has been given by Luigi Tosti in his *Storia della Badia di M. C.* (3 vols. Naples, 1841–43).

Caso'ria, a town of Italy, province of Naples, on the railway between Rome and Naples, 4½ miles N. of the latter city. The chief produce is silk. Pop. 8000.

Cas'pe, a town of Spain, province of Saragossa, near the Ebro, 57 miles S.E. of the town of Saragossa. It has manufactures of oil and soap. Pop. 7500.

Cas'pian Sea (the *Mare Caspium* of the ancients; Russ. *Chvalinskoi More;* Turk. *Kuzghun Denigi*, 'raven sea;' Turkoman, *Kök-Küz;* Pers. *Darjâ-i-Chyzyr*), the largest lake in the world, lies in the greatest depression of the earth's surface, in the Turanian lowlands, between Europe and Asia, and is bounded by Russia, Turkestan, and Persia. It extends from N. to S., is 765 miles long and 190 broad, and has an area of 178,776 sq. miles. Its greatest depth is 2820 feet, and its surface is 84 feet below the level of the Black Sea. The chief rivers which enter it are the Volga, Ural, Kur, Terek, and Kuma. The C. S. has no ebb or flow, and its superfluous waters, which are more or less salt, are carried off solely by evaporation. Its level sinks in winter, and rises in June and July, when the rivers are in flood. The shores are mostly low-lying, have many deep bays, but are either of a sandy or swampy character. Of the numerous coast-islands, the most remarkable is Tscheleken, S. of the bay of Krasnovodsk, with numerous naphtha springs. The C. S. is not only traversed by the steam and sailing vessels of Russia, but is now the station of a regular fleet. There are numerous Russian forts on or near its shores, as Gurjev, Astrakhan, Kisliar, Petrovsk, Tarku, Derbent, Novo Alexandrovsk, &c. Chief among the Persian towns with which there is an active Russian trade are Resht, Amol, Farahabad, Astrabad, and Sari. Beside the regular trade, which is rapidly increasing, Russia has important caviare, sturgeon, and bream fisheries at the mouths of the larger rivers, worth nearly £1,000,000 yearly. From Aristotle downwards, the C. S. was supposed to open into the Northern Ocean; and to Van Ruysbroeck, a Franciscan monk (1252–53), belongs the credit of declaring it an inland sea. It is believed to have received the Oxus and Jaxartes in ancient times. For the first time it was accurately surveyed by the Russian Government in 1858–62, and a special survey took place, with the view of restoring the Oxus to its former bed, in 1875. See Baer, *Kaspische Studien* (Petersb. 1855), Melguno, *Das südliche Ufer des Kaspischen Meeres oder die Nordprovinzen Persiens* (Leips. 1868), Yule, *The Book of Sir Marco Polo* (2 vols. Lond. 1871), and a critique of this last work in the *Edinburgh Review* (No. 275, 1872).

Casque. See HELMET.

Cass, Louis, an American politician, born in Exeter, New Hampshire, in 1782, began life at the bar of Ohio, and in the Legislature of that state assisted in suppressing the Aaron Burr secession movement. In the war with England, C. was extremely active in the campaigns of Generals Hill and Harrison on the Canadian frontier, rising to the rank of brigadier-general. He successively became Governor of Michigan, War Minister under Jackson, and Envoy at Paris, when the delicate questions of the right of search and the boundary, referred to the King of Holland, were being discussed. Disapproving of Webster's Treaty of Washington with Ashburton (1842), he returned to the States, represented Michigan in the Senate, stood twice as Democratic candidate for the President's chair, for which his vacillating views on slavery and the extradition question unfitted him. He has written, among other things, the *History, Traditions, Languages, &c., of Indians in the United States*, a work partly superseded by the great work of Hubert H. Bancroft. He died at Detroit, 17th June 1866. C. enunciated the 'Squatter Sovereignty' doctrine.

Cassan'der, son of Antipater, King of Macedonia, at whose death, in B.C. 319, he was left at the age of thirty-five in a subordinate position to Polysperchon. Feeling aggrieved, he resolved to wrest the power from his opponent, and succeeded. While leading his victorious forces in the S. of Greece, he heard of the cruelties of Olympias, Alexander's mother, hastened northwards, besieged her in Pydna, forced her to surrender, and put her to death, 316 B.C. In the same year he placed Roxana, Alexander's wife, and her son, Ægus, in custody at Amphipolis, and married Thessalonica, Alexander's half-sister, in whose honour he founded the town of that name. In B.C. 315 he rebuilt Thebes, and became involved in a war with Antigonus, which lasted fourteen years, with a brief interval of peace in 311 B.C., during which he murdered Roxana and her son. Having entered into a league with Seleucus and Lysimachus, he defeated and slew Antigonus at Ipsus, 301 B.C. Four years afterwards he died of dropsy.

Cassan'dra, a town in Roumelia, European Turkey, on the S.W. coast of a peninsula of the same name (anc. *Pallene*), and on the E. shore of the Gulf of Salonica, has a considerable trade in grain, silk, wool, and honey. In 1873 there entered the port 330 vessels of 5596 tons. Pop. 9000. The Gulf of C., an inlet of the Ægean, extends from S.E. to N.W., and is about 10 miles across and 35 long.

Cassandra, the fairest daughter of Priam and Hecuba, and twin-sister of Helenus, was beloved by Apollo, who conferred on her the gift of prophecy, which, from her treating his suit with disfavour, he rendered of no account by ordaining that no one should believe her words. Hence her predictions concerning the wooden horse and the fall of Ilium were disregarded by the Trojans, who deemed her mad. On the taking of Troy she was ravished by Ajax, son of Oileus, in the temple of Minerva. She fell to Agamemnon's share of the spoil, was taken by him to Mycenæ, and there murdered by Clytemnestra.

Cassa'no, an ancient town of N. Italy, province of Milan, on the Adda, 16 miles E.N.E. of Milan, with numerous silk-mills. It is famous for the victory of the Imperialists, under Prince Eugene, over the French, under Vendôme, 16th August 1705, and for the defeat of the French, under Moreau, by the Russians and Austrians, under Suwarrow, 27th April 1799. Pop. 5592.—A second C. is in the province of Cosenza, Calabria, Citeriore, 32 miles N.N.E. of the town of Cosenza. It has a cathedral and old castle, and manufactures of table-linen, cotton, silk, leather, and oil. Pop. about 8000, among whom are numerous Arnauts and Greeks.—A third C. is in the province of Bari, which has some copperworks, and a pop. of 4219.

Cass'areep is the inspissated juice of the bitter cassava root, *Jatropha manihot*, largely prepared in British Guiana as a basis of various sauces, and particularly of the famous W. Indian pepperpot. It possesses remarkable antiseptic powers, and meat boiled with the addition of C. is found to keep very much longer than by ordinary boiling. C. was originally a 'buck' or native Indian preparation. The juice of which it is prepared is highly poisonous when newly expressed, but the heat of boiling entirely dissipates the volatile poisonous matter.

Cassa'tion, Cour de, was established under the name of the Tribunal de C. by the law of 1st December 1790. It sits on appeal on all final judgments, civil or criminal, of the inferior tribunals, especially in matters affecting the due administration of justice, *e.g.*, where there is a conflict of jurisdictions, or an allegation of interest against the judge. It annuls (*casser, quatere*, 'quash') all judgments in which forms have been violated, or a text of the law has been manifestly contravened. The sentences of *Juges de Paix* are not subject to appeal. In all civil cases the appeal must be brought within three months from the date of the judgment appealed against: a period extended to six months for Corsica, and twelve for American colonists. The appeal (except in cases of compulsory taking for public purposes) is first considered by the Bureau des Requêtes, or 1st Section of the Court, consisting of sixteen judges. The *intitulé* of the appeal gives the names of the parties; the *dispositif* gives the law or laws in question. With the appeal must be lodged a *quittance de consignation d'amende*. A vote of three-fourths of the judges is required in the Section for definite rejection or admission. There is then a preliminary report by one judge, the case going before the 2d or 3d Section (each of sixteen judges), according to whether its subject-matter is civil or criminal. The 1st Section also hears certain appeals. In each Section eleven votes are required for a judgment, which, however, is not on the merits, a remit being made to the original court, or to the proper court. A second appeal is allowed in each case to the United Chambers (Law of April 1837), and the Procureur-Général may appeal for the public interest in the matters mentioned in Art. 83, Code of Civil Procedure. The salaries of the judges vary from 5000 to 2000 frs., with a *traitement* equal to that of a deputy in Parliament. There are other officers, such as the *commis de parquet* and the *greffier en chef*, connected with the court.

Cassa'va, the purified starch obtained from the roots of the manioc plant, *Janipha Manihot* (*Manihot utilissima*, and *Jatropha Manihot*), and *J. Lœflingii*. The juice of the C. plant is at first poisonous, but after being concentrated by heat it becomes innocuous, and is known as Cassareep (q. v.). See MANIOC and TAPIOCA.

Cassay', or **Muneepur**, an independent state of Further India, on the frontier of Burmah, of which it was formerly a province. Area, 7584 sq. miles; pop. estimated at 30,000, the majority of whom are Brahminists. It lies mainly in a great valley, encircled by precipitous mountains, and watered by tributaries of the Irrawaddy. Its productions are cotton, tea, indigo, opium, tobacco, &c. Muneepoor is the capital of C., which has been ruled by a native rajah since the Burmese war of 1825, when the British occupied the country for a time.

Cass'el, the French form of the German *Kassel* (q. v.).

Cassel, also **Castel** (the *Castellum Menapiorum* of the Romans), a town and railway station in the department of Nord, France, on a hill 16 miles S. of Dunkirk. The view from Mont Cassel is singularly extensive. C. has manufactures of lace, linen, hosiery, hats, soap, and pottery, and there are breweries, tanneries, and currying establishments. It has besides an important trade in cattle. Pop. (1872) 3069.

Cass'ia, a genus of plants of the natural order *Leguminosæ*. Senna consists of the leaflets of various species, *e.g.*, Alexandrian senna consists of the leaflets of *C. acutifolia* and *C. obovata*, mixed with the leaves of other plants, as well as the pods of two species of C. E. Indian or Tinivelly senna, a fine variety, consists of the leaflets of *C. elongata*. Aleppo senna is composed of the leaflets of *C. obovata*, a native of Northern Africa, but also cultivated in India and elsewhere. *C. Marilandica*, of N. America, possesses similar properties to the sennas mentioned, which are due to the presence of *Cathartin* (q. v.). Various other sennas are known in commerce, but are of less value than the preceding. (See SENNA.) More than 100 species of C. have been described. The bark and roots of several species of the E. and W. Indies and Mauritius are used as applications to ulcers and various skin diseases, and internally in diabetes and other diseases. The seeds of *C. occidentalis* serve in the Mauritius and in Central Africa as a substitute for coffee. It is cultivated in both regions, but is a native of the E. and W. Indies. The seeds of *C. absus* and *C. auriculata* are used as a remedy for ophthalmia, and the bark of the latter species is also used in India for tanning leather. The pods of *C. Fistula*, the pudding-pipe tree—the C. pods, pipe C., or purging C. of the shops, are used in medicine. The officinal part is the pulp surrounding the seeds, which is a mild laxative.

C. bark, or China cinnamon (*C. lignea*), is largely imported in Europe as a substitute for the true cinnamon. The *oil of C.* is similar to the oil of cinnamon. *C. buds* are its dried flower-buds. They are in appearance like cloves, and are used in confectionery. The 'C.' of the ancients and of the Old Testament is probably C. bark.

Cass'ia, or Poet's Casia, is a shrub (*Osyris alba*) of the natural order *Santalaceæ*, a native of the S. of Europe. Its beautiful but modest appearance has attracted the attention of various poets. For instance, Keats speaks of—

'The drooping flowers
Of whitest cassia, fresh from summer showers.'

More prosaically the twigs are used for making crates.

Cassia'nus, Joannes, was a monk of Scythian extraction, educated in a monastery at Bethlehem, who resided some time among the anchorites of Egypt before going to Constantinople, where he was ordained deacon by Chrysostom. Having gone to Rome in 404, he was there ordained presbyter; and on the capture of that city by the Goths (410) he settled at Massilia (Marseille), where he founded a monastery and a nunnery; the former being the famous Abbey of St Victor, of which he himself was abbot. It is said to have contained 5000 inmates, and served as a model for similar institutions in Gaul and Spain. C. died about 433. The principles and rules of his monastic system may be seen in his *De Institutis Cœnobiorum*, and his *Collationes Patrum Sceticorum*. He is best known for his writings against Augustine's views on grace and works, on account of which he is regarded as the founder of semi-Pelagianism (q. v.). The best edition of C.'s works is that of Gazäus (Arras, 1628; Leips. 1733). See Wigger's *De Johanni C.* (Rost. 1824-25).

Cass'ican (*Cassicus*), a genus of American *Insessorial* birds, belonging to the *Conirostral* section of that order, and related to the familiar starlings (*Sturnidæ*). The bill is conical in shape, sharp at the apex, and elevated on the forehead and towards its base. The nests are constructed with much ingenuity, by weaving together vegetable materials, such as shreds of bark, &c. The familiar species (*C. cristatus*) known as the crested C., or crested oriole, inhabiting Paraguay, Brazil, and Guiana, thus makes a nest about 36 inches long, and suspends it from the end of the branch of tall trees, in a position so as to secure it against the attacks of monkeys, serpents, and other invaders.

Cassi'ni, the name of a family illustrious in the annals of science. The first and greatest, **Giovanni Domenico C.**, celebrated for his astronomical discoveries, was born at Perinaldo, near Nice, June 8, 1625. He studied at Genoa and Bologna, at the latter of which places he became Professor of Astronomy in 1650. His first work, *Observationes Cometæ Anni* (1652-53), was published at Modena in 1653; and in 1664 and 1665 he observed and determined at Rome the paths of two comets. He then investigated and rectified the motions of Jupiter and his satellites; and through his *Ephemerides Bonienienses Mediceorum Siderum* (Bol. 1668) attracted the attention of Louis XIV. of France, who invited C. to France, and appointed him in 1669 Director of the Paris Observatory. Here he made the first observations, after Kepler's, of the zodiacal light; discovered four of Saturn's satellites, and the dual character of that planet's ring; gave the law of the moon's axial rotation, and extended in 1683 the measurement of the arc of the meridian from Paris northward, which had been begun by Picard in 1669. C. died at Paris, September 14, 1712. His treatises and memoirs are very numerous; most are astronomical, and many were naturally of transient interest and importance. His *Autobiography* was published by his grandson, C. de Thury.—**Jacques C.**, son of the preceding, and successor of his father at the Observatory, was born at Paris, February 18, 1677, and died at Thury, near Clermont, April 16, 1756. From his father's latest meridian measurements, in which he assisted, he deduced that the earth was an oblong spheroid—a result quite antagonistic to Newton's laws of the universe. His view will be found in his *De la Grandeur et de la Figure de la Terre* (Par. 1820). His *Éléments d'Astronomie* (Par. 1740), with its supplementary volume of *Tables Astronomiques, &c.* (Par. 1740), is his best work.—**César François C. de Thury**, son of Jacques C., whom he succeeded at the Observatory, was born June 17, 1714, and died September 4, 1784. He is especially celebrated as a topographer, his great *Carte Topographique de France* being unrivalled for its size and accuracy. It was finished in 1793 by his son, **Jean Dominique, Comte de C.** (born June 30, 1747, died October 18, 1845), who also succeeded his father in the Observatory. Besides this great map of 180 leaves, the latter published the *Atlas National* (83 leaves, each of which represented a department) in 1791. With him ended the famous family of C., for his son, **Alexandre Henri Gabriel, Vicomte de C.**, born at Paris, May 9, 1781, had died April 16, 1832, while engaged in the publication of a botanical work, entitled *Opuscules Phytologiques* (3 vols. 1826-34). See *Vie de C. écrite par lui-même*, in the *Mémoires pour servir à l'Histoire des Sciences et à celle de l'Observatoire Royal de Paris* (1810), and the *Éloges* pronounced on the various members of the family in the *Académie des Sciences*.

Cassiodo'rus, a Latin writer, distinguished as scholar, statesman, and compiler, was born at Scylaceum (*Squillace*), in Calabria, 468 A.D. He was of noble family, and by his talents rose in favour with Odoacer, under whom he filled several important positions. After the fall and murder of Odoacer, he attached himself to the fortunes of Theodoric, was appointed to the highest offices of the state, and conducted affairs with great ability and prudence. Fearing dangers ahead, he resigned his honours and withdrew to the country in 524 A.D., but was recalled after Theodoric's death, and as Prime Minister resumed the conduct of affairs. In his seventieth year he retired to his native province, founded the monastery of Viviers, and devoted the remainder of his long life to the copying of MSS., and the compiling of manuals for the advancement of learning. He died about 568 A.D. His most important work—a valuable collection of state papers, entitled *Variarum Epistolarum Libri XII.*—was first printed at Augsburg in 1533. His lost work, *De Rebus Gestis Gothorum*, partly preserved to us in the abridgment of Jornandes, would have been of still greater value to the world. The

Benedictine Garet published an edition of C.'s works at Rouen (2 vols. 1679), to which is prefixed a *Vita Cassiodori.*

Cassiope'ia, a constellation of the northern hemisphere, the principal stars of which form a somewhat straggling W, about as distant from the pole-star as the Plough, but in the opposite direction.

Cassiquia're, a remarkable river of S. America, in the S. of Venezuela, links (like a canal) the Orinoco and the Rio Negro, a tributary of the Amazon, and thus connects the two great water-systems in the N. and centre of the continent. It has a S.W. course of 130 miles.

Cass'is, a genus of *Gasteropodous* molluscs, including forms the shells of which are popularly known as 'helmet-shells.' These shells form the objects so much employed for engraving cameos upon—the *C. cornuta*, or horned helmet, showing white cameos on a rich orange ground; whilst the warty helmet (*C. tuberosa*) shows white on a deep red ground. The ruddy helmet (*C. rufa*) shows saffron-yellow cameos on an orange ground; whilst the queen conch (*C. Madagascariensis*) exhibits, when cut, a white on a claret-coloured ground. All the species of C. are inhabitants of warm seas.

Cassiter'ides. See SCILLY ISLES.

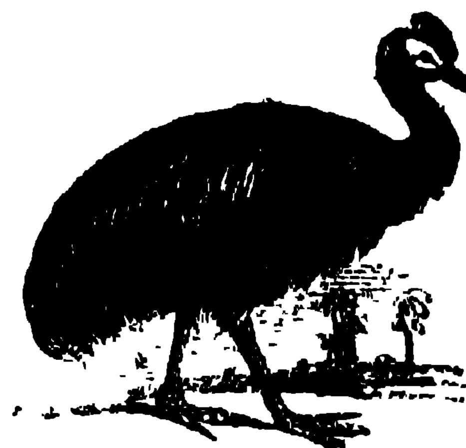
Cass'ius, C., Longinus, a celebrated Roman who held the office of Quæstor under Crassus in the Parthian expedition, B.C. 53, in which he greatly distinguished himself. On the breaking out of the civil war he sided with Pompey; was taken prisoner by Cæsar, but afterwards pardoned and promoted. In 44 B.C. he was made *prætor peregrinus*, and was promised the province of Syria; but his mean and jealous nature led him to conspire against the man to whom he owed everything. He soon won over to his base design many of the malcontents of the aristocracy, and among them Brutus, whose half-sister, Junia, he had married. C. carried his plot into execution 15th March 44 B.C., and at the distribution of provinces among the assassins received Cyrene. Dissatisfied, he left the city, seized Syria, united his forces with those of Brutus, plundered Rhodes and Lycia, crossed the Hellespont, and marched through Thrace to Philippi, where he encountered Octavian and Antony, 42 B.C. The left wing under C. was repulsed by Antony, while the right under Brutus routed the troops of Octavian. C., ignorant of the success of his confederate, ordered his freedman Pindarus to run him through the body with the very weapon with which he had, pierced Cæsar. C. was a man of rash and violent temper, but of refined and scholarly tastes, and an Epicurean in philosophy.

Cass'ius, Purple of, is a substance produced when a solution of protochloride of tin is mixed with one of a salt of gold. It is named from its discoverer, C. of Leyden (1683). There are several recipes for its preparation, one of these being as follows:—A solution of protochloride of tin is added to a solution of perchloride (sesquichloride) of iron, till the mixture assumes a green tint; this is then added drop by drop to a dilute solution of chloride of gold free from nitric acid, and the brown precipitate which separates after twenty-four hours is washed and dried. P. of C. is sometimes employed in staining glass and porcelain rose or purple: it was formerly used in medicine. Its production affords a valuable means of recognising either gold or tin. It appears to consist of a mixture in varying proportions of finely divided metallic gold and binoxide of tin or stannic acid (SnO_2).

Cassivelau'nus, a British chief in high repute as a warrior, ruled over the country N. of the Thames, and was invested with supreme command on Cæsar's second invasion of Britain, 54 B.C. Cæsar, learning the site of his capital, attacked and took it, on which C. fled and soon after sued for peace, which he obtained on giving hostages and promising to pay an annual tribute.

Cass'ock (Fr. *casaque*, Ital. *casacca*) is a clerical vestment, of the nature of a long garment, fitting tight, and reaching to the ground. In the Roman Catholic Church the colour for ordinary clergy is black; for bishops, violet; for cardinals, scarlet; and for the pope, white. In the Anglican Church the usual colour for all orders of the clergy is black.

Cass'owary (*Casuarius*), a genus of *Cursorial* birds, including several species, and belonging to the *Struthionidæ*, or Ostrich family. They inhabit the Moluccas, New Guinea, New Britain, and N. Australia. The best-known species (*C. galeatus*) was first brought alive to Europe by the Dutch. It stands about 5 feet in height. The toes number three on each foot, and are provided with claws of nearly equal size, the claw of the inner toe being usually the longest. It is distinguished by a horny crest of varied colours on the head, whence the specific name *galeatus*. The head and neck are naked, but are provided with long, pendant wattles. The plumage, like that of other cursorial birds, is of a loose, unconnected character. The rudimentary wings are furnished each with five pointed quills, destitute of barbs. The body plumage is black, and consists of long, pendant feathers, very much resembling hairs in general appearance. The males are smaller than the females, and sit upon the eggs. The food consists of grass, seeds, and fruits; these birds swallowing stones and hard substances, like the ostriches, to assist the triturating powers of the gizzard. The eggs are greenish. The feet and wings are used as organs of defence; and each wing possesses a terminal spur.


Cassowary.

Cassytha'ceæ, a natural order of plants, by some considered a section of the *Lauraceæ*, consisting alone of the genus *Cassytha*, of which there are nine species, all leafless parasitic twiners, resembling the dodders in habit. In Australia, some of them are called scrub-vines, and in places grow so thickly as to make travel almost impossible. The white drupes of *C. cuscutiformis* of N. Australia are edible. *C. filiformis* of India is used by the Brahmins for seasoning their butter-milk, and also, when mixed with sesamum oil, for strengthening the hair. In medicine it is employed to cleanse inveterate ulcers; and the juice, mixed with sugar, is considered an infallible remedy for inflamed eyes. All the species are tropical, but are found both in the New and Old Worlds.

Cast, a reproduction of a model—as a work of sculpture or other production of fictile or mechanical art—obtained by pouring or pressing plaster, wax, metal, or other substance while in a fluid or ductile state into a Mould (q. v.). The art of casting is of the highest antiquity, and has been of great value in multiplying impressions of the chief works of sculpture, and of the industrial and decorative arts, and thus placing forms of beauty and articles of use in the hands of people of all classes and nations. Reproductions of busts, statues, &c., in bronze are C.; but the process, when applied generally to works in metal, is called Founding (q. v.).

Casta'lia, a fountain on Mount Parnassus, called after the nymph of that name. Being sacred to Apollo and the Muses, its waters were fabled to bestow the poetic afflatus.

Casta'lio or **Castell'io** (the Latinised form of *Châteillon*), **Sebastien,** a French Protestant theologian, born in Dauphiné in 1515, and about 1540 presented to the chair of Humanity at Geneva by Calvin. Banished from this city in consequence of a quarrel with his patron, he repaired to Basel in 1544, where he obtained the Greek chair, and where he died, 29th December 1563. C.'s chief work is a Latin translation of the Bible, of which the best edition is that of Basel (fol. 1573). In addition to numerous theological treatises, he published an edition of Xenophon (1540), and Latin translations of the Iliad (1561) and Odyssey (1567).

Casta'nea. See CHESTNUT.

Cas'tanets, a musical instrument of percussion, consisting of two small shell-shaped pieces of wood or ivory struck together by the forefinger and thumb. They are little used except in ballets, to bring out the rhythm of the dance.

Castaños, Don Francisco Xavier de, Duke of Baylen, one of the few Spaniards who showed generalship as well as gallantry in the Peninsular War, was born at Madrid in 1796, and studied the military art in Prussia. Along with his subordinate, the Swiss soldier Aloys Reding, he performed the

wonderful feat of compelling (July 22, 1808) a French army of 20,000 men under General Dupont to surrender at Baylen. He fought under Wellington in various battles of the war; and although from his blunt manners he was no favourite at court, his talents procured him various important military offices. He died, 24th September 1852.

Castanosper'mum, a genus of plants of the order *Leguminosæ* (sub-order *Papilionaceæ*). *C. australe* yields the Moreton Bay (Queensland) 'chestnuts,' so called from these seeds, when roasted, having the flavour of chestnuts.

Caste. The divisions of C., as stated in the Code of Menu and the Vedas, are as follow:—(1) The *Brahmins*, or sacred class, whose persons are sacred; they study the Vedas, legislate for the other classes, live upon alms (which include gifts on occasions of religious ceremony), and are exempt from taxation and from capital punishment. They also teach the Vedas: part of their life is that of an anchorite, but its final object is peaceful meditation on the divine order. (2) *Kshatryas*, the military class, from whom officers of Government are selected, and by whom the executive is carried on. Their duties are, to 'give alms, to sacrifice, to read the Veda, to shun sensual gratification, and to defend the people.' Like the Brahmins, they have important privileges in criminal law. (3) *Vaisyas*, or mercantile class, who cultivate the land, breed cattle, carry on trade, and lend at interest. (4) *Sudras*, or lowest class, servants chiefly of the Brahmins; they are incapable of reading the Vedas and of accumulating property, and even (except in times of scarcity) of independent industry. Abusive language used by a Sudra towards a superior is punished by the loss of the tongue; while the penance for killing a Sudra is only what is required in the case of killing a cat. Although thus socially depressed, the Sudras are not slaves. Mixture of C. is prohibited by degradation of the offspring, as where the son of a Brahmin woman and a Sudra becomes a Chandala. The above quadruple division is merely theoretical, the actual division of the Hindu population being into Brahmins and Sudras, and into a great number of special castes, which vary from one part of the country to another, and are often founded on distinctions of trade or locality. Thus the Coolies, the Zemindars (landholders), the Kaits (writers), have been called castes; so also the Rajpoots, the Goojurs. C. as it is described in the Shasters, the Derma Purana, and the Commentaries of the Pundits, probably never existed; in whatever degree it existed, the intercourse with Great Britain must have constantly diminished its effects, especially in industrial relations. For instance, English merchants rank only as Sudras, yet they can hire as servants natives of the highest C. In S. India, indeed, wealthy native Sudras have been known to hire Brahmins as cooks. C. is, in fact, a mass of heterogeneous and often inconsistent regulations with regard to the lawfulness of eating and drinking, the intercourse of one class with another, &c It does not secure the principle of hereditary professions, and the prohibition of intermarriages may be regarded as its most prominent feature in modern times. The regulations of the East India Company in many respects gave a mistaken encouragement to C. conceived as an absolute division of employments. Thus the Rajpoots (the descendants of the Kshatryas) were admitted to the army as Sepoys, while the Coolies, Choomars, Mullahs, &c., were excluded; Vakeels (lawyers) and Moonsiffs (or inferior judges) were maintained in the administration of justice, and native Christians were in 1814 actually declared incapable 'of filling any public office of respectability.' The influence of C. in contracting the feeling of brotherhood within certain limits, and so begetting pride and apathy for what is outside, has been to deaden patriotism and make the Hindus accept without question an arbitrary rule. To awaken them by all means to a sense of political and social responsibility is the main problem of the present enlightened administration. A striking illustration of the inherent selfishness of C., and, perhaps, also of their trust in the undivided authority of Government, occurs in the practice of theft (*decoitee*), which often ravages a neighbourhood, simply because there is no public spirit, the misfortunes of one C. not being those of another. The good discipline which the Sepoy troops rapidly attained has been attributed partly to this want of political solidarity, and to the fact that off parade the native regiments (both officers and men) associated rather according to C. and religion than according to rank, which made conspiracy difficult. In the great mutiny of 1857, the loyalty of the Sepoys in the insurrections of Benares (1781 and 1801) and Mysore (1807) is sometimes forgotten. On the other hand, military discipline has interfered with, and tended to destroy, special rules of C.—*e.g.*, in marching troops beyond the Indus, in providing the cavalry with hogskin saddles, in prohibiting the eating of meals naked, and, above all, in ignoring C. in the selection of officers. So far as civilisation has gone under the system of village communities, it may be admitted that C. has acted usefully as a conservative force, but it seems inconsistent with an advance beyond that system; and in social relations outside the community its immoral tendency is sufficiently obvious. It is responsible for much of the perjury practised by even respectable witnesses in the courts of justice, and it also favoured the growth of the Thugs, the Pindarrees, and the Sennassie Fakirs, coalitions for the commission of crime which could not have existed without the sanction of C. It has also retarded the intercourse of Europeans and natives, and among its minor effects may be noticed the ridiculous *punctilios* of domestic servants in Bengal and elsewhere. Particular castes, as the Rajpoots of Rajasthan, from the difficulty of intermarriage, practised infanticide. In many cases the Brahmins (the symbol of whose order is the *poita* or sacred thread) have sunk into coarse religious *mendicity*. It has been contended that either C. or some other stringent system of minute positive morality was necessary to sustain the Hindu character against an enervating climate and the frequent convulsions of foreign conquest; in support of this the degraded state of the Pariahs, or casteless class, has been quoted. This may have been the case when C. was strong enough to punish both crimes and mere moral delinquencies, but in its present state C. is entirely opposed to social order and progress. To the instance of the Pariahs may be opposed that of the Sikh tribes, whose great leader, Nanik Baba, abolished C. in the early part of the 16th c. It was, however, at one time debated whether C. should not be recognised by the missionaries at Christian communion, and used as a means of discipline in school. The trifling and superstitious ceremonialism of C., which the spread of education, especially among women, does more to destroy than any direct attack of positive law or missionary enterprise, may be seen in chap. 4, 'on economics,' and chap. 3, 'on diet,' of the *Code of Menu*, and in *Kurma Lochma*, a Sanskrit work on 'domestic duties.' A vigorous protest against C. is at present made by Baboo Chunder Sen's new Theistic Church of Calcutta. Theorists have tried to derive C. from the fact of conquest, of superior beauty in one race, of a double migration (an intermediary class being produced by fusion), &c. It would rather appear to be a religious institution, founded on the once natural tendency to hereditary employments and the necessity for abstinence and purification in tropical climates. The notions of purity and impurity were no doubt manipulated by the priesthood. It is remarkable that tradition assigns the institution of C. to gods: in India to Brahma, in Egypt to Isis, in Bactria to Diemschid, in Assyria to Mahabad. The reformer Buddha opposed himself to C., but his followers in Ceylon were forced to re-establish it, the *Radias* of Ceylon being equivalent to the *Pariahs* of India. Ampère has shown reason for supposing that in Egypt there were no castes proper. See Muir's *Sanskrit Texts* (vol. ii. 1870); M'Naghten's *Principles of Hindu Law* (7th ed. by Wilson); Talboys Wheeler's *Hist. of India* (vol. i.); Sherring's *Castes of Benares* (1868); *People of India* (Government publication), edited, with photographic illustrations, by Watson and Kaye (6 vols. 1868–72); Steele's *Castes of the Dekhan;* Colebrooke's *Enumeration of Indian Classes* (in his *Asiatic Researches*, vol. v.), and the Memorandum in his Life (1872); *Report on Progress and Condition of India* (1873).

Casteggio. See MONTEBELLO.

Cas'tel, a town in the Hesse-Rhine province, on the right bank of the Rhine, nearly opposite Mainz, of which it forms a fortress of defence, and with which it communicates by a floating bridge. It is on the Wiesbaden Railway, and has an active trade in cattle. Pop. (1871) 5245. C., as its name indicates, is of Roman origin, and occupies the site of a place called *Castellum Mattiacorum*, which forms the subject of one of Becker's works (Wiesb. 1863). C. is the name of several other small towns and villages in Germany.

Castel is also a prefix to the names of numerous places in Italy, Spain, and France, of which the following merit notice:—

CASTEL-BOLOGNE'SE, a town of Italy, province of Ravenna, 22 miles W.S.W. of that city. Here the Milanese defeated the Florentines in 1434.

CASTEL-BUO'NO ('fair castle'), a town of Sicily, province of Palermo, 8 miles S.E. of Cefalu. It is noted for its mineral springs. Pop. 5288.

CASTELFIDAR'DO, a town in Italy, province of Ancona, near Loretto, among low-lying hills between the rivers Aspis and Musone. It was brought into prominence by a crushing defeat inflicted on the Papal troops under General Lamoricière by the Piedmontese under General Cialdini, on September 8, 1860. Pop. 6275.

CASTELFRAN'CO, a town of N. Italy in the province of Treviso, on the river Musone, about 14 miles W. of Treviso. It contains a cathedral and large palace. Pop. 9319. C. was taken, January 12, 1801, by the French, who also here defeated the Austrians, November 23, 1805.

CASTEL-GANDOL'FO, a town of Central Italy, province of Latium, situated on Lake Albano, 11 miles S.E. of Rome. It is in the midst of very beautiful scenery, and was long a stronghold of the Savelli family.

CASTELLAMA'RE ('castle by the sea'), a fortified city of S. Italy, province of Naples, about 17 miles S.E. of the city of Naples. It has a cathedral, a royal palace, and an ancient castle, built in the 12th c. There are linen, silk, and cotton manufactories, besides dockyards and tanneries, and the town is resorted to for its hot baths and mineral springs. C. stands near the site of the ancient *Stabiæ*, sacked by Sylla during the social war, and from the ruins of which C. has been for the most part constructed. Pop. 21,794. In one of the convents there is an image of the Virgin of extraordinary sanctity in the eyes of the peasantry, who annually visit her shrine.

CASTELLAMARE, a town in Sicily, on a gulf of the same name, 20 miles E. of Trapani. It exports wine, fruit, manna, and some cotton. Pop. 8000.

CASTELLAMON'TE ('castle on the hill'), a town of N. Italy, province of Turin, 10 miles S.W. of Ivrea. It has an ancient castle, extensive market-place, manufactures of pottery, and a trade in wine, cattle, and dairy produce. Pop. 5641.

CASTELLA'NA, a town of Italy, province of Bari, 25 miles S.E. of the city of Bari. Trade in fruits, wine, &c. Pop. 9691.

CASTELLANE'TA, a town of Italy, province of Lecce, on the railway connecting Bari and Taranto, 21 miles N.W. of the latter. It is the seat of a bishop, and has a cathedral and several convents. Cotton is among the chief products of the district. Pop. 6525.

CASTELLAZ'ZO, a town of N. Italy, province of Alessandria, on the Bormida, 5 miles S.W. of the town of Alessandria. Pop. 5749.

CASTELLEO'NE, a walled town of N. Italy, in the N.W. of the province of Cremona, on the railway between Cremona and Bergamo, 16 miles N.W. of the former. The neighbourhood produces cereals, silk, cheese, honey, &c. Pop. about 6000.

CASTELL'ON DE LA PLANA, the capital of a province of the same name, Spain, on the Valencia-Catalonian Railway, 3 miles W. of the Mediterranean. It lies in a fertile plain (*La Plana*), is a modern town, surrounded by a wall pierced by eight gates, and has active manufactures of hemp, linens, sailcloth, &c. Pop. 19,297. The *province* of C. is in great part mountainous, and has an area of 205 sq. miles, and a pop. (1870) of 296,222.

CASTELNAU'DARY, a flourishing town of France, department of Aude, 25 miles S.E. of Toulouse by railway. It lies on the Canal du Midi, which here widens into a fine basin (*le reservoir de St Ferréol*) 1200 feet long and 900 broad, with extensive quays and wharves. It has a court of the first instance, a commercial college, and an exchange, with manufactures of cloth, linen, chalk, glass, and brick. Pop. (1872) 7721. C. stands on the site of the Gothic *Castrum novum Arianorum* ('the new castle of the Arians'), of which the present name is a corruption, and was at one time capital of the county of Lauragais. It witnessed a bloody conflict between Raymond of Toulouse and Simon de Montfort in 1212, and was taken and burned by the Black Prince in 1355, but was rebuilt eleven years later.

CASTELNUO'VO ('new castle'), a fortified seaport in the S. of Dalmatia, Austria, at the entrance to the Bay of Cattaro. It has a naval school. Pop. of commune (1870), 6105; of town, 540.—C. is also the name of a small village in 'the Coast-Land' in the same empire, 21 miles S.E. of Trieste. Pop. of commune (1870), 6718.

CASTEL-VETRANO, a town in Sicily, province of Trapani, 46 miles S.W. of Palermo, has coral and alabaster industries. Pop. (1872) 20,420.

Castell'an, the keeper of a castle, an officer of respectable rank in the middle ages. He was generally a man of some property of his own, and had a voice in the local administration of justice. In Poland, after the 16th c., the title of C. qualified the holder of a certain amount of property for a seat in the upper legislative chamber or senate.

Castiglione ('little castle'), an old town in the province of Catania, S. Italy, a little to the N. of Mount Ætna. It overlooks the valley of the Cantaro, and has a ruined castle and an old church with a picturesque dome. Pop. 5000. C. revolted against Frederick of Aragon in the war of the Vespers, 1297.

Castiglio'ne, Baldassarr'e, Count, an Italian statesman and *littérateur*, was born 6th December 1478, at Casatico, Mantua. He studied at Milan, was sent as ambassador from Guidobaldo, Duke of Urbino, to Henry VIII. of England, and was highly trusted by Popes Leo X. and Clement VII. He died at Toledo, 2d February 1529. C.'s most famous work, *Il Libro del Cortegiano* (Venice, 1528; at Padua in 1733), containing instructions how to become an accomplished courtier, is written with exquisite grace. He also composed poems in Latin and in Italian, which are models of elegance. His *Letters* (2 vols. Pad. 1769–71) are important, both from a literary and a political point of view. See Budik's *Lateinische Dichter*, vol. ii. pp. 136–183.

Castiglione, Carlo Ottavio, Count, an Italian linguist and archæologist, was born at Milan in 1795. He published in 1819 a description of the Kufic coins in the cabinet of Brera there, which at once established his reputation as an antiquarian. In 1819 he was a *collaborateur* with Angelo Mai in editing some fragments of Ulfilas' translation of the Bible into Mœso-Gothic, discovered by the latter among the palimpsests of the Ambrosian Library. These C. afterwards followed up by fragments of some of the Pauline epistles, enriched with erudite excursuses. He died at Genoa, 10th April 1849. His Biography by Biondelli appeared at Milan in 1856.

Castiglione dell'e Stivie're, a town of N. Italy, province of Brescia, 22 miles N.E. of the city of Mantua. It has two beautiful churches and a theatre, and was at one time a residence of a younger branch of the ducal house of Gonzaga. C. is walled and defended by an old castle. Near it Bonaparte defeated the Austrians under Wurmser in 1796. In the neighbourhood is Solferino, where Napoleon III. in 1859 also defeated the Austrians. Pop. 5705.

Castiglione, Lago di, in the province of Siena, Central Italy, is 10 miles long and 1 to 3 broad, receives several rivers, of which the chief is the Bruna, and is connected with the Mediterranean by a canal 42 miles long.

Castile' (so called from the numerous castles erected as a defence against the Moors), formerly the name of an independent kingdom of Spain, has no longer a political or administrative meaning, but geographically denotes that portion of the great central plateau bounded N. by the Cantabrian Mountains, S. by the Sierra Morena, E. by the hills of Aragon, and W. partly by Leon and partly by the Portuguese frontier. A mountain range divides it into Old (*Vieja*) and New (*Nueva*) C., the former of which is now subdivided into twelve provinces, having a total area of 72,447 sq. miles, and a pop. (1870) of 3,182,667, and the latter into five, with an area of 30,882 sq. miles, and a pop. (1870) of 1,541,772. Old C. is in great part an arid waste, but in the E., as in the provinces of Burgos and Soria, there are many fertile valleys and plains, producing excellent wheat, maize, wine, &c. It is about 3000 feet above the sea, has a gentle westward slope, and is watered by the Douro and its tributaries. The rich mineral resources are still unwrought, but there is extensive cattle-rearing in the highlands, which here and there are covered with forests of chestnut, oak, fir, and pine. New C. is almost a counterpart of the more northerly division, but lies 1800 feet lower, and is more fertile in the production of corn and wine. It also yields in some parts olive oil, saffron,

hemp, silk, and fruits. There are extensive mines of salt, lead, and quicksilver. Railways now traverse both districts, though most of the produce is still conveyed on the backs of mules. In both divisions the climate is one of great extremes. The Arab conquest of Spain included the whole of C. In 933, while the Ommiades were engaged in the subjugation of Morocco, Fernando Gonzales converted the district of Burgos, an offshoot of Leon, into an independent state. It passed by inheritance (1028) to Sancho III., of Navarre, who, at his death in 1036, made it a kingdom, and placed it under his son, Fernando I. the Great. This king wrested Leon and Navarre from his two brothers, and on his death divided his dominion between his three sons. Alonso VI. of Leon, who succeeded his brother as King of C., conquered the Moorish territory of Toledo in 1085, and held it as New C. for a short time. In 1230 it was permanently annexed by Fernando III., who founded a lasting dynasty. His most illustrious successor was his son, Alfonso X. (q. v.). Isabella, sister of Enrique IV. of C., married the Crown Prince, Fernando of Aragon, in 1469, and succeeded her brother in 1474, so that on the death of Juan II. of Aragon the two lands were united. (See FERDINAND THE CATHOLIC, and ISABELLA.) Fernando conquered Granada in 1492, and Navarre in 1512, thus bringing the whole of Spain under one rule. Intrigues, rebellions, and domestic strifes were what prevented C. from asserting at a much earlier period its pre-eminence, on account of its stronger and more central position, over all the other Spanish states. The Castilians are distinguished for more than Spanish haughtiness, and their language is that of the educated classes and of the national literature.

Castillo'a, a genus of plants of the natural order *Artocarpaceæ*. *C. elastica* is said to yield all the india-rubbers of Central America, Equador, New Granada, and the W. Indies, which are known commercially as 'W. Indian, Carthagena, Nicaragua, Honduras, Guyaquil, and Guatemala rubbers' (Collins).

Castill'on, a town in the department of Gironde, France, on the Dordogne, 10 miles W. of Lilbourne by railway. Here the English were vanquished by Charles VII. of France, July 1453. Montaigne, the essayist, was born and died in the vicinity.

Cast'ing, a technical term in the art of Angling (q. v.), denoting the throwing of the line. It should be raised gently from the water, so as not to be broken should a fish seize the lure at the last moment. It should then be waved over the right or left shoulder, then sharply propelled so as to cause the lure to fall on the spot at which the fish is expected to be lying. Care must be taken not to give the forward movement until the whole of the line is at a right angle, behind, to the rod; otherwise the artificial fly, or bait, will probably be jerked off, and the line will not fall straight on the water, the lure, consequently, not reaching the desired spot. In artificial fly-fishing, it is well to raise the point of the rod slightly when the fly is falling, so as to cause it to fall lightly, which is naturally, on the water.

Casting-Net, a kind of net for the catching of fish, used, with various modifications, in different parts of the world. Those used in England are usually about 15 or 16 feet in circumference. They are netted in the shape of a cone, but so as to be capable of being spread out in a flat circle, to whose circumference perforated leads are attached, with strings to raise the net after it has been sunk. The edges being raised first, they are then drawn together, and the net is lifted. The C.-N. is an illegal implement for the capture of river-trout. See NETS.

Casting Vote is the vote which the president of an assembly is usually empowered to give in the event of the other votes being equally divided. The right to give the C. V. does not, however, exist by common law; it must be created by statute, or agreement, or immemorial usage. In the House of Commons, the Speaker has the C. V. In the House of Lords, the Speaker's vote is counted with the rest, and in case of an equality of votes the *non-contents* are held to have the majority. In an election of a member of Parliament for a county or borough, if there is an equality of votes, the returning officer, if a registered elector of the county or borough, is empowered to give the C. V.

Cast Iron is iron containing from 2 to 5 per cent. of carbon. It is hard, crystalline, comparatively brittle, and readily fusible in an ordinary furnace. It is manufactured in the form of 'pigs' in the Blast-Furnace (q. v.). The C. I. of commerce varies very much in quality. 'Foundry pig,' or grey iron, is known as Nos. 1, 2, and 3, and 'forge pig,' or white iron, as Nos. 4 and 5. No. 1 is used for fine castings; Nos. 2 and 3 are harder, stronger, and more suitable for large structures; Nos. 4 and 5 melt at lower temperatures; they are very hard and strong, but so brittle as to be of little use except for conversion into wrought iron. It is generally supposed that the differences between grey and white iron are due to the different states in which the carbon exists in them, but this does not seem to be definitely proved. See IRON.

Cas'tle (Lat. *castellum*, dim. of *castrum*, 'a fortified place'), originally a military post protected by walls and other defences; later a fortified residence. From the commencement of the historical period fortified works existed in Britain, and it is considered probable that, in many cases, the Roman camps which mark so many of the commanding positions of the country, were constructed on sites that had previously been occupied as strongholds by the tribes that Cæsar conquered. Of distinctively British works, the chief, according to Britton, are the Herefordshire Beacon (Worcestershire), the Caer-Caradoc (Shropshire), Moel-Arthur (Flintshire), Chun C. (Cornwall), Maiden C. (Dorsetshire), the Caterthuns (Forfarshire), and the Barmkin of Echt (Aberdeenshire). Of the Roman castles in Britain, the oldest is supposed to be Richborough C. in Kent, in the remains of which the leading features of the stationary encampments (*castra stativa*) are still traceable. During the earliest English period, the fortresses which existed in the island were neither important nor numerous, and no authenticated remains of them are extant. Properly, the C.-building era in England commenced shortly after the Norman conquest. According to the *Chronicle*, it was enormously accelerated by the civil confusions and social disorders of Stephen's reign. Such was the activity of the Norman barons in rearing castellated residences, that England, in proportion to her population, is richer in castles, especially of the strictly Norman or round-arched Gothic age, than any country in Europe. The Tower of London, and the Castles of Rochester, Norwich, Rising, are, as early examples, unmatched either in France or Germany, while among later structures the Castles of Raglan, Chepstow, Kenilworth, Warwick, and Windsor are unrivalled for picturesque beauty and architectural magnificence. In Domesday Book forty-nine castles are named, and during the reign of Stephen the number erected is said to have been 1115. But in England, as in every country in Europe, the C.-building tastes of the first barons were found to be inconvenient, and the numerous strongholds of the country were as often held against the king as for him. Henry II., therefore, enacted that it was unlawful to erect a C. or fortify a residence without licence. In Scotland there are no remains of Norman castles, for no Norman families had succeeded in taking root in Scotland until the Norman style of architecture had developed into pointed Gothic. But of castles in the latter style there are in Scotland a number of fine examples. The oldest of these, perhaps, is Hermitage, erected in Liddesdale prior to 1244, and the cause of an invasion of Scotland in that year by the King of England, who regarded the erection of this great border fortress as practically a threat on the part of his northern neighbours. Other examples of Scottish castles of the pointed Gothic period are those of Bothwell, Caerlaverock, Kildrummy, and Dirleton. The Castles of Edinburgh, Stirling, Dumbarton, &c., which are mentioned from the earliest times, were places of defence, but were not castles in the strict sense: they were rather fortified ramparts enclosing unfortified buildings, often built of wood. The border Peel Tower (q. v.) sprang up as a necessity during the war of independence to provide against sudden surprise. The Norman C., in its simplest form, consisted of a central keep or stronghold, with a court (in which were situated the stables and other inferior buildings, and offices) protected by walls, often fortified by towers, and surrounded by a fosse or ditch, across which access was obtained into the C. by a drawbridge and gate-house. After the invention of gunpowder, castles which, however strongly fortified, could present no adequate defence against artillery, ceased to be built in England; and in the erection of the later baronial structures, convenience and architectural effect are the objects chiefly aimed at in the plan of the building.

Castlebar' (in the *Four Masters*, '*Caislen-an-Bharraighs*;' called by Downing, 1680, Castle Barry; belonged to the Barrys

after the English invasion), the capital of Mayo County, Ireland, on a river of the same name, 50 miles N.W. of Roscommon by railway. It has a west-end square, and its two principal streets extend at right angles. There are some manufactures of coarse linen. C. was the scene of the massacre of the forces of the Parliament during the rebellion of 1641, and here 'Fighting Fitzgerald' was executed in 1786. The town was occupied in 1798 by the French, who retired on the approach of Cornwallis. —The river C. rises in a lake 5 miles S.W. of the town, and enters Loch Cullen after a course of 15 miles.

Castlereagh', Lord. See LONDONDERRY, MARQUIS OF.

Castles are among the *armes parlantes* in heraldry—charges allusive to some feat, or to the name, title, office or property of those who bear them. C. are often given as charges in the shields of persons who have been prominent in a successful siege. They are generally represented as crowned with three turrets.

Cas'tletown (Manx, *Balla-Chastal*), the capital town of the Isle of Man, in the southern extremity of the island, and on the W. shore of C. Bay. Rushen Castle (according to Manx belief) is a Danish fortress of the 10th c., within the town, and was besieged in 1313 by Robert Bruce. The keep is the prison of the island, and the other portions are used as public offices. Near the castle is the House of the Keys—the Parliament of the island. There are breweries, tanneries, and cornmills in the town and its vicinity. C. has a small shipping trade. Pop. (1871) 2320. About 1 mile N.E. is King William's College, founded in 1830.

Cas'tor and Poll'ux, two conspicuous stars in the constellation Gemini, named after the *Dioskouroi*, sons of Zeus, twin-children of Leda. The former is a double star, its period of revolution being nearly 253 years.

Castor and Pollux, a meteor occasionally appearing at sea, and attaching itself in the shape of twin balls of fire to the extremities of the masts of ships. It is now known as the *fires of St Elmo*, believed by sailors to prognosticate fair weather; but one ball, called Helena, forebodes a storm.

Casto'reum, Castor, is the secretion contained in two membranous sacs found near to the genital organs of the Beaver (q. v.). These sacs are pear-shaped, and united at their necks. When dried, their appearance gave rise to the erroneous belief that they were the testicles of the beaver. The secretion is oily, viscid, and possessed of a strong odour. C. is said to contain Salicin (q. v.) and carbolic acid. It has been used in medicine for more than 2000 years as a remedy in spasmodic diseases of the nervous system, and was considered to have a special action over the uterus. C. comes chiefly from Hudson's Bay. Its virtues are more imaginary than real, and it is not now much used.

Castor'idæ, a family of *Rodent* mammalia, represented by the Beavers (q. v.), Musquash (q. v.), &c., and distinguished by the possession of distinct clavicles or collar-bones, and by each foot being provided with five toes, those of the hinder feet being generally webbed. The teeth typically number two incisors, two præmolars, and six molars in each jaw.

Castor Oil. This very well known and extensively used mild purgative oil is obtained from the seeds of *Ricinus communis*, a native of the E. Indies, but now extensively cultivated in the S. of Europe and in various parts of the United States. The seeds are of an ovoid form, vary in size from a small filbert down to a large pea, have a greyish-brown speckled covering, and grow enclosed in a prickly three-partite carpel. Two principal kinds of C. O. are recognised in British pharmacy, E. Indian and Italian, and in both cases the oil is obtained by two separate processes. What is known as *cold-drawn* oil is thus prepared in India. After the seeds have been sifted and freed from impurities they are slightly crushed between rollers, freed from husks, and enclosed in a 'gunny' bag, in which they are pressed into the form of an oblong brick. The bricks are piled up between iron plates and squeezed in a hydraulic press, and the oil which exudes is received into a tin vessel. It is then boiled up with water, in the proportion of a pint of water to a gallon of oil, till the whole of the water evaporates, when it is instantly withdrawn. The boiling coagulates the albuminous matter and precipitates mucilage to the bottom of the pan. The oil is then passed through a bag filter, and is ready for use. The *hot-drawn* is obtained by boiling the seeds, then shelling and pounding to a pulp, and again boiling till the whole of the oil rises to the surface and is skimmed off. The seeds yield from 45 to 50 per cent. of oil. In addition to its medicinal use, C. O. is employed in India for lamps; it yields a good soap, which has been proposed for medical purposes; and it is an ingredient in some excellent pomades and preparations for the hair. The dose of C. O. for a child is from 1 to 2 drachms, and for an adult 1 to 2 oz. It should be slightly warmed and taken in milk, or with the addition of some aromatic oil.


Castor-Oil Plant.

Castrameta'tion (Lat. *castra*, 'huts, a camp;' *metari*, 'to lay out'), the art of encamping. It embraces the entire laying out of camps, whether the troops to occupy them are to be hutted, under canvas, or bivouacked. The selection of a site is a question of great importance in C. See CAMP, ENCAMPMENT.

Cas'trén, Mathias Alexander, famous for his investigations among the European and Asiatic races of the extreme N., was born at Tervola, not far from the northern boundary of Finland, 2d December 1813. After a preliminary education at the Finnish town of Tornea, he pursued a course of study at Helsingfors University. Between the years 1838 and 1840, C. was busied in making journeys on foot through the northern districts of his native land. He studied its dialects, and also its folk-lore and ballads, with a special view to the illustration of the national myths. The result of these researches was his translation into Swedish of the *Kalevala*. This is the great poem of the Finns; and on C.'s version of it Longfellow modelled his *Hiawatha*. C. was chosen linguist and ethnographer to the Academy of St Petersburg, and afterwards became Professor of Finnic Language and Literature at Helsingfors. The dialects of the Lapps of Norway, Finland, and Russia, of the Russian and Siberian Samoiedes, and of the tribes of Yakutsk, were in turn the objects of his laborious study. C. died 7th May 1852, while engaged in giving literary shape to the ample knowledge he had gathered. Among his works are *Elementa Grammaticæ Syrjaenæ* (1844), *Elementa Grammaticæ Tscheremissæ* (1845), and an *Ostiak Grammar* (St Petersb. 1849). Since C.'s death the Finnic Society have published his *Nordiska Resor och Forskningar* (Hels. 1852-55), and the *Föreläsningar om Finsk Mythologie* (Hels. 1853). His Grammar and Dictionary of the Samoiedic Dialects appeared at St Petersburg (1854-55), his Ethnological Lectures on the Altaic Peoples in 1857, and some minor writings in 1862.

Cas'tres (anc. *Castrum Albiensium*), a town in the department of Tarn, France, on the river Agout, 46 miles E. of Toulouse. It is regularly built, has some fine promenades lined with trees, and several handsome public buildings. The manufactures of wool-dyed goods, called *cuirs de laine*, are noted. There are besides tanneries, paper-mills, silk-weaving establishments, and brassfoundries. From 1317 to the Revolution of 1789 C. was the seat of a bishop. It was a stronghold of the Huguenots, and for a time the residence of Henri IV., but in the reign of Louis XIII. it submitted to the royal authority. Pop. (1872) 16,458.

Cas'tri, or **Kas'tri**, a village on the southern slope of Parnassus, nomarchy of Phocis, Greece, on part of the site of ancient Delphi. The Castalian Fount (q. v.), famous in the writings of the classic poets, is a little to the E. of the village, and, from a chapel of St John close to its source, is now called the Fountain of St John.

Cas'tro (the ancient *Mitylenê*), a seaport town on the W. coast of the island of Mitylené, Asiatic Turkey, 55 miles N.W. of Smyrna. It has a double harbour, is defended by a wall with flanking towers, and a castle, and has some shipbuilding. Pop. 6500.

Castro, Ines de, a beautiful Spanish lady, daughter of Pedro Fernandez de C. Dom Pedro, Prince of Portugal, secretly

married her in 1345. Alfonso IV., the prince's father, lest this alliance should prejudice the son of Pedro by his former wife, had Ines cruelly murdered in 1355. The prince was scarcely restrained from revolt; and, becoming king on Alfonso's death two years later, had justice done on the assassins, and declared the marriage legal. A strange ceremony was then performed: the corpse of Ines was disinterred, dressed in royal robes, crowned, seated on a throne, and so received homage. This tragic story has formed the theme of dramas and poems; Landor founds a fine tragedy on it, and it is the subject of a splendid episode in Camoens' *Lusiad*.

Castro del Rio, an old town of Spain, province of Cordova, on the Guadajocillo, 16 miles S.E. of Cordova, has manufactures of woollens, linens, and pottery. Pop. 9100.

CASTRO-GIOVANN'I, a town of Sicily, province of Catania, in the *Val di Noto*, 4000 feet above the sea, has some trade in sulphur. It is on the site of the *Enna* of antiquity, the chief seat of the worship of the goddess Ceres. The neighbourhood is the reputed scene of the abduction by Pluto of her daughter Proserpine—'in Enna gathering flowers.' The ancient town played an important part in the Punic and Servile wars. Pop. (1872) 14,633.

CASTRONUO'VO, a fortified town of Sicily, province of Palermo, on a hill 35 miles S.S.E. of the city of Palermo. Near it are some marble quarries. Pop. 4029.

CASTROVILLA'RI, a town of S. Italy, in the heart of a mountainous district in the N. of the province of Cosenza, 33 miles N. of the town of the same name. It is defended by an old Norman castle, stands on the great Calabrian road from Naples to Reggio, and trades in silk, wine, and other agricultural produce. Pop. 7931.

Cast Steel is Blister Steel (q. v.) melted in crucibles. It is the purest and strongest kind of steel, and is used for the finest cutting implements.

Castue'ra, a town of Spain, province of Badajoz, on the Badajoz and Madrid Railway, 78 miles E. by S. of the former town. It has some weaving, and brick and earthenware manufacture. Pop. 5600.

Casual Poor are those temporarily relieved but not put on the *Poor-Roll*. See POOR-LAWS.

Casualties of Superiority, in Scotch law, are certain emoluments arising to the Superior (q. v.) depending on uncertain events. The superior is secured in these by his Charter and Sasine (q. v.). They form a *Debitum Fundi* (q. v.) preferable to the vassal's creditors. This preference is not confined to arrears or current feu-duties, but extends to Non-Entry and Relief Duties, and to the composition for Singular Successors. See these titles.

Casuari'na, a genus of trees constituting the order *Casuarinaceæ*. In appearance they are like gigantic horsetails (*Equisetaceæ*), and are natives of tropical Australia, the Indian Islands, New Caledonia, &c. In the former country they are sometimes called *oaks* or *Cassowary* trees, and from their sombre appearance they are planted in the cemeteries of the antipodes. The wood from its redness is called *beefwood*, and is much valued as a fuel for steam-engines, ovens, &c. That of *C. tuberosa* is used for roofing shingles (Bennett's *Gatherings of a Naturalist in Australia*). *C. muricata* of Southern India furnishes a showy though heavy wood, and its bark a brown dye. The same may be said of *C. equisetifolia*, the *Toa*, *Aitoa*, or ironwood of the South Sea Islands, the natives of which used to make their clubs, &c., of it. At one time the Fiji Islanders made forks of it, with which they ate human flesh, all other kinds of food being eaten with their fingers alone. These forks are highly valued, being handed down from generation to generation, each being distinguished by its particular, often obscene, name (Seemann). Several species of C. are grown in our greenhouses. About twenty in all are known (Masters). The order *Casuarinaceæ* is allied to *Ephedra*, among the *Coniferæ*, and still more so to *Myricaceæ*, and other amentaceous groups.

Cas'uistry is a systematic treatment of difficult and doubtful questions of morality, to which the everyday rules of right and wrong, and the conscientious feelings founded on these, either do not apply, or in answering, seem to conflict with some wider margin of conduct. From the skill and perseverance of the Jesuits in trying to reduce C. to scientific rules, it has been supposed that it is a weapon of Ultramontane ambition. Pascal, in his *Letters Written to a Provincial*, has pointed out that the zeal of the Jesuit confessors led them in some cases to shake the authority of all moral laws; but it is now seen that C., as an habitual practice of mankind, and to some extent as a theory of conduct, is an ancient institution, not confined to one Church, country, or age. Thus the *Talmud* contains much unprofitable refining on morality. Aristotle (*Nic. Eth.* ii.) treats of the circumstances which render anger just, and of immoral obligations contracted under torture. Plato, in the *Euthyphron* and *Crito*, discusses the conflict of public duty with private affection, and of religious duty with political loyalty. The Greek tragedies often turn on points of C. (as the *Antigone* of Sophocles); and in the *De Officiis*, Cicero puts the celebrated question about the sale of corn at Rhodes. The Old and New Testaments abound in problems of C., although they are not treated scientifically; and in the early Church it was keenly disputed whether Christians should use the false certificates of incense-burning issued by the Libellatici or tolerant magistrates. In the Post-Nicene period, Chrysostom (in his *De Sacerdotio*) and Augustine (in his *De Mendacio* and *Contra Mendacium*) are casuists proper, though the latter says all lies are equally wicked. Among schoolmen, Thomas Aquinas (in the *Secunda Secundæ* of his *Summa Theologiæ*) is the chief casuist. Among casuists in Great Britain, Bishop Sanderson (in his Oxford Lectures *De Conscientia*), Taylor (in his *Ductor Dubitantium*), Paley (in his *Moral Philosophy*), Keble (in his *Letters of Spiritual Counsel*), and J. H. Newman may be mentioned. Besides these, Milton, Swift, and Johnson approved of practical C., and Hallam, Sismondi, and Stephen, as historical critics, have justified its existence as a science. Abbé Gaume (*Manual for Confessors*, translated by Pusey and Forbes, 1875) and Cardinal Gousset (*Théologie Morale*) have written the latest books on the subject. Among the problems of C. still extensively canvassed in this country, we select party-obedience, anonymous journalism and authorship, espionage, privileged communications (*e.g.*, between doctor and patient), pleading in court for prisoners who have confessed guilt, social expenses, treatment of lunatics, &c. It is generally admitted that lying may be practised to save the life of a patient, as when Lady Russell told her dying daughter that it was 'all well' with her dead sister. Two very singular cases of C. have recently occurred: the prosecution for manslaughter of the peculiar people, who, founding on Scripture, refuse to obtain medical assistance, and the offer to compound a felony in the case of the Dudley jewels. Massillon justly said that the C. of his time had increased with social depravity; but apart from the abuse which has been made of the confessional, there is no doubt a legitimate province of discussion in which the healthiest moral natures may seek enlightenment without losing faith.

Ca'sus Amissio'nis, in Scotch law, denotes the accident by which a legal instrument is supposed to have been lost or destroyed. This accident, or C. A., must be set forth, if an action be brought for proving the tenor of the lost document. See CANCELLING; TENOR, PROVING OF.

Ca'sus Bell'i is the alleged cause, being presumed a sufficient one, for countries declaring war against one another.

Cat (*Felis*), a name popularly applied to the Carnivorous mammals included in the family *Felidæ*, but also restricted to certain species in that family, of which the wild C. (*Felis catus*) may be selected as a typical example. In the true cats, the ears are not provided with tufts of hairs, and the tail is elongated—the nearly allied lynxes differing in having short tails and tufted ears. The domestic C., described under the name of *Felis domestica*, has been variously supposed to have arisen from the wild C., and from an Egyptian species, the Egyptian C. (*Felis maniculata*), a native of Nubia, and which was highly honoured by the ancient Egyptians, being found frequently embalmed and mummified, according to the custom of that nation. This animal, which also occurs on the W. side of the Nile, possesses upright ears, and fur of a brownish-grey colour, darkest on the back; the under parts being white, and the body being variously streaked and striped with black and ochre. The length is about 2 feet 5 inches; the tail being about 9 inches long. The wild C. occurs throughout Europe and N. Asia, and

has been met with in Nepaul. In Britain it has well-nigh been exterminated. The tail of the wild C. is short and bushy; that of the domesticated C. is slender and tapering. The ground-colour of the fur on the former is sandy grey, marked by dark stripes and bands, much resembling the markings in a tiger. The tail is also banded; its tip is black and bushy; and it is not half the length of the head and body. The fur is thick, and grows very dense in Northern specimens. The average length of the adult male is 3 feet. In Ireland it attains a large size, and is found chiefly on waste grounds. The domestic C. appears, even when allowed to become wild, to retain its special characters, seen in its tail, fur, &c. In general character, it is neither so treacherous nor so insusceptible of kindly influences as has been generally supposed. On the contrary, many stories have been related of the affection and extraordinary instinct it has displayed, frequently under unusually curious circumstances. Various branches or sub-varieties of the domestic race exist. The *Angola C.*, possessing long, silky, white hair and an extremely bushy tail, is a well-known form; it attains a large size. The *Manx*, or *tailless cats*, are notable as possessing a very abortive and rudimentary tail, and as in general presenting in habits a near approach to the wild C. The *Chinese C.* is known by its rich glossy fur and its long, pendant ears. The *tortoiseshell C.* may perhaps be hardly deemed a distinct sub-variety, mere colour being in all cases a deceptive guide in the distinction of species. Cats are well known to possess singular electrical properties. The eye is capable of great contraction and dilatation under the influence of light, and is thus specially adapted for nocturnal vision. Whilst in Egypt cats were much reverenced, they have been superstitiously regarded elsewhere as emissaries of evil powers, and as prophesying disasters by their simplest actions—*e.g.*, by washing their faces foretelling rain. See also LYNX.

Cat, a nautical term variously applied. A *C.-hook* fastens the ring of the anchor to the *C.-blocks*, through which works the *C.-fall*, a rope for hoisting the anchor from the water to the bow, where the rope is connected with the *C.-head*, a short, strong timber projecting from the bow. Small ropes for tightening the shrouds are called *C.-harpings*.

Catabro'sa (Gr. 'a gnawing'), a genus of grasses widely distributed through the whole of Europe, and also in tropical America, in moist situations. *C. aquatica* (whorl-grass, or sweet-water grass) is a common British grass, the foliage of which is relished by cattle, as also by carp and other fishes, and by waterfowl, a large portion of whose food it furnishes.

Cat'acombs (Fr. *catacombe*, Low Lat. *catacumba*, from two Greek words signifying 'a hollow' or 'a tomb underground'). These are burial-places formed by excavating subterraneous passages in soft rock, and then hollowing a portion of the rock at the side of the gallery large enough to hold a body. The body being placed in the hollow, the orifice is closed with stones. The most celebrated C. are those near Rome. They were used as places of worship in times of persecution by the early Christians, and in them are buried many of their saints and martyrs—the letters D.M. (Deo Maximo) or X.P. (the two first Greek letters of the name of Christ) commonly marking the last resting-place of the Christian. The original extent of these C. is not known, many portions of them having fallen in. There are also noteworthy C. at Naples, and in Sicily, in Greece, Asia Minor, Egypt, and various other countries. They have also been discovered in S. America. The Neapolitan C. contain some paintings in wonderful preservation. The C. of Paris were constructed in 1784 out of the limestone quarries. In them were deposited the bones of the dead collected from the ancient cemeteries of Paris, and, by decree of the Government, the bodies of some of the victims of the Revolution. See Parker's *Archæology of Rome; The C.* (Oxf. 1877).

Catafal'co, an Italian word meaning 'a scaffold,' 'a funeral canopy,' applied to a temporary piece of woodwork decorated with paintings and sculpture, representing a tomb or cenotaph, and employed in funeral solemnities. The French form is *catafalque*, which first appears in the 16th c.

Catala'ni, Angel'ica, a famous Italian *prima donna*, born in 1783 at Sinigaglia (Ancona), received her early education at the convent of St Lucien, near Rome, where, singing in the choir at the age of thirteen, such was the effect of her marvellous voice, that the priests and monks openly applauded her. Her musical tutor was the celebrated singer Marchesi. In 1798 (at the age of fifteen) she made her *début* in Venice, went to Lisbon in 1801, remained there four years, and there became the wife of Captain Vallabrecque. Accepting an engagement in London in 1806, she set out for England by Paris, where her singing so enchanted Napoleon that he besought her, in vain, to remain at his court. In London, where she remained eight years, she created an enthusiasm unequalled afterwards till the days of Jenny Lind. In 1814-15 she was Directress of the Italian Opera at Paris; she afterwards made the tour of Europe, and in 1830 purchased a villa at Florence, where, in superintending the education of her own children, and in conducting a singing-school for girls which she had founded, she spent nearly twenty years. In the summer of 1849 she removed with her daughter to Paris, and there, on the 13th June of that year, she died of cholera. To great personal attractions and rare intelligence, she added astonishing power and compass of voice and the most perfect technical accomplishment. See Lumley's *Reminiscences of the Opera* (Lond. 1864).

Catalau'nian Plain, the *Campi Catalaunici* of the ancients, a wide plain in the E. of France, on which one of the most momentous battles in the history of the world was fought in 451 A.D. The barbaric hordes of Etzel (Attila) were vanquished by the Roman general Aetius, and the Visigoth King Theoderic, after a murderous fight, in which, according to exultant rumour, some 300,000 Huns were slain. The plain surrounds Châlons-sur-Marne.

Catal'do, San, a town of Sicily, province of Caltanisetta, 5 miles W. of the town of Caltanisetta. Sulphur-mines are in the vicinity, and a railway connecting it with Catania and Girgenti is in process of construction. Pop. upwards of 10,000.

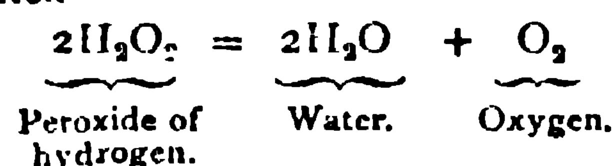
Cat'alepsy (Gr. *katalepsis*, 'a seizure or attack'). This is a name given to a nervous affection characterised by a more or less complete but temporary suppression of sensation and volition, along with muscular rigidity, so that the individual remains in the same position as that in which he happened to be at the beginning of the attack. It is a rare disease in its extreme forms, and it usually happens in nervous and hysterical females. Occasionally it becomes endemic—that is, a number of persons in the same locality become affected. It is also frequently associated with religious excitement, when it is known as ecstasy or trance. The person is absorbed in contemplation of some imaginary celestial object, and, with eyes immovably fixed, becomes insensible to all external objects. Others seeing him or her may become similarly affected, as in the case of the victims of the dancing mania, tarantism, and other semi-religious epidemics. The physiological explanation of C. is by no means clear. The state is closely associated with all those physiological conditions in which there is abstraction of mind. The muscles appear to be removed from the control of the will, and there is also apparently an abrogation for the time of the activity of the muscular sense by which the mind is informed of the state of the muscular apparatus and the position of the limbs. C. is a morbid condition, and those subject to it may become permanently insane. All those exercises which apparently induce it in certain individuals are therefore to be avoided, and the general health is to be improved as much as possible by nervine tonics and good hygienic influences.

Catalo'nia (Sp. *Cataluña*), a former principality and province of Spain, occupies the N.E. angle of the Peninsula, and has a coast-line on the Mediterranean of about 200 miles. It is now divided into the provinces of Barcelona, Tarragona, Lorida, and Gerona, having a total area of 12,180 sq. miles, and a pop. (1870) of 1,773,408. The N. portion of C., which is bounded by the Pyrenees, is a rugged mountain region, and the basin of the Segre in the W. is separated from that of the Llobregat on the E. by a range, the S. part of which is called the Sierra de Lona. This range is about forty miles from the coast, descends to the plains in a series of terraces, and is intersected by numerous valleys. There are rich plains in the W. about Lerida, Urgel, and Manresa, and smaller fertile stretches in the E. in the vicinity of Barcelona, Tarragona, and Tortosa, producing corn, wine, oil, hemp, nuts, almonds, silk, barilla, oranges, &c. The climate is extremely variable; hot, inland, in summer, but tempered on the coast by sea-breezes. There are heavy rains and frequent fogs. A singular scarcity of cattle is due to the limited extent of good

pasturage. On the other hand, C. is very rich in metals, of which the chief are coal, copper, manganese, zinc, lead, and sulphur. It has also been called the 'Lancashire of Spain,' on account of its extensive manufactures, which include woollens, cottons, silks, lace, leather, paper, iron, brandy, and liqueurs. The Catalonians (*Catalaines*) are a mixed Franco-Spanish people, distinguished from all other Spaniards by their love of travel and enterprise in trade. Even the educated classes use a dialect originally formed by blending the *Langue d'Oc* with the Castilian; and is still a written speech, with an interesting literature. C. was part of the *Hispania Tarraconensis* of the Romans, and on the decline of the Empire in the W. was overrun successively by the Alans and the Goths, hence receiving the name *Goth-Alania*, altered to Gothalunia, and later to its present form. The S. portion was subdued by the Arabs in the 8th c. In 788 A.D. Karl the Great conquered the country as far as the Ebro; and C., as the principal portion of the 'mark' or 'border,' was subsequently ruled by the Frankish Counts of Barcelona. The latter, however, soon made it an independent principality, and by the marriage of Count Raymund Berengar it was united with Aragon in 1137. In 1469, by the marriage of Ferdinand of Aragon and Isabella of Castile, C. became an integral part of the Spanish monarchy. It still, however, retained a separate constitution till the war of succession of Philip V. in 1714. Since then the Catalonians have been animated by a national hatred of everything foreign. Of late years the peasantry have been distinguished by a turbulent adherence to the Carlist cause, while the large towns, *e.g.*, Barcelona, have been a hotbed of socialistic democracy.

Catal'pa, a genus of *Bignoniaceæ*, containing four or five species of trees, natives of the W. Indies, N. America (where they are known as 'trumpet-flowers'), Japan, and China, but which also thrive in the open air in the S. of England, France, and Germany. The wood is fine-grained, durable, and capable of receiving a good polish. The bark is tonic, stimulant, and antiseptic, but the honey from the flowers is poisonous (*Treasury of Botany*).

Catal'ysis (Gr. 'dissolution'). There are many instances in chemistry of substances combining together or decomposing into other products only when another substance is present, which takes no apparent part in the reaction, but which appears to bring it about simply by its presence. Thus, if metallic silver is dropped into peroxide of hydrogen, water is formed, and oxygen gas escapes. The decomposition which takes place may be thus represented—



$$\underbrace{2H_2O_2}_{\text{Peroxide of hydrogen.}} = \underbrace{2H_2O}_{\text{Water.}} + \underbrace{O_2}_{\text{Oxygen.}}$$

The silver itself remains entirely unchanged. This and similar changes are called *catalytic*, or decompositions by contact, and remain unexplained in the majority of cases.

Catamaran' (Cingalese, *cathamaran*, 'floating trees'), a sort of raft in use on the eastern coasts of India and Ceylon, formed of three long pieces of wood lashed firmly together lengthwise. It is chiefly employed in fishing, and is paddled with wonderful dexterity by the natives, who venture out into the heavy surf prevailing on these coasts, where any ordinary craft would be swamped. C. is also the name for a kind of fireship.

Cata'nia, the finest city in Sicily, lies on the gulf of the same name, in a beautiful plain, near the base of Mount Etna. It is regularly built, and the streets, which intersect each other at right angles, are paved with lava. There are many handsome edifices, of which the principal are the famous Benedictine church and convent of San Nicolo, a chaste cathedral, originally of 1094, rebuilt in 1693, the university, founded in 1445, and an imposing senate-house. C. is not only 'La Bella Catania,' but is also an industrial centre, with manufactures of silks, linens, hosiery, and fancy articles in lava, amber, &c., and an export trade in grain, oil, and wine. Its harbour was filled with lava in 1693, but its roadstead is safe and spacious. Pop. (1872) 83,496. C., the ancient *Catana*, was founded about 753 B.C. by a colony of Greeks from Chalcis, and rapidly rose into prosperity. It was captured by the Athenians during the Sicilian expedition (Peloponnesian War), was subsequently (403 B.C.) pillaged by Dionysius I., but again became an important place under Roman rule. The Goths partly destroyed the city, which once more regained prosperity under the Byzantine Empire. It was all but entirely ruined by an eruption of Etna in 1693, and has suffered much from eruptions at various other times. The *province* of C., part of which is called 'the granary of Sicily,' has an area of 1743 sq. miles, and a pop. (1872) of 495,415.—**The Gulf of C.**, on the E. coast of Sicily, receives the Giaretta, and extends from Aci Reale on the N. to Santa Croce on the S., a distance of 18 miles.

Catanza'ro, the capital of a province of the same name, S. Italy, on a hill, overlooking the Gulf of Squillace and the Ionian Sea. It is the seat of a bishop, of a court of appeal, and of a famous college, and has an old Norman castle, a cathedral, a lyceum, and some ten churches. The chief industry is silk-spinning. Pop. (1872) 24,901. The women of C. are esteemed the most beautiful in all Calabria. The *province* has an area of 2303 sq. miles, and a pop. (1872) of 412,226.

Cat'aplasm (Gr. 'poultice'), generally consists of some soft substance capable of absorbing much moisture and retaining heat. It ought to be light, and of such a consistence as to fit accurately to the part to which it is applied. Cataplasms are of two kinds—(1) Those intended to supply heat and moisture, which are made of linseed-meal and various vegetable substances, as carrots or marsh-mallow; (2) Those designed to produce a beneficial influence, as opium, poppy-heads, or hemlock to relieve pain, charcoal to correct the bad odour from foul ulcers, yeast to hasten sloughs from ulcers, or mustard or turpentine to produce irritation. Such are said to be 'medicated.' Cataplasms should never be heavy nor bulky, and ought to be frequently repeated. They are good in inflammatory affections of the chest and bowels, and generally wherever there is much pain.

Cat'apult, a warlike engine employed by the ancients in a siege for projecting darts, arrows, and other missiles. Catapults appear to have differed greatly in construction; in some the principle of the crossbow was adopted; in others huge beams of wood were set in motion by the aid of twisted fibres, hurling the missiles with great velocity. Similar machines were in use during the middle ages prior to the invention of gunpowder, for throwing large stones, fire-balls, &c. Experiments were lately made in France with catapults fashioned after those represented on Trajan's Column, and arrows were shot to a distance of 300 yards, and with great precision to 180 yards.

Cataract (Gr. 'a rushing down,' as if a veil fell before the eyes), is an affection of the eye in which there is opacity of the crystalline lens or its capsule. Three varieties are usually described—(1) *Lenticular C.*, when the *lens* is affected; (2) *Capsular C.*, when the *capsule* is affected; and (3) *Capsulo-lenticular C.*, when both are opaque. The effect of this opacity is to intercept the rays of light on their way to the retina. In C. the fibrous texture of the lens is broken up. The affection differs in regard to density. *Hard C.* has a dark-brown colour. The lens is often smaller than normal, and the greatest amount of opacity is in the centre. The iris is movable, and when the pupil is dilated by atropine or belladonna, the affection is more distinctly seen. This form of C., common in old people, is often an indication of the decay of the system. First there is dimness of vision, as if a mist or cloud was before the eye. The patient sees best in a dull day or in the twilight, and vision is improved by belladonna or atropine dilating the pupil, and thus allowing the rays of light to pass by the outside of the C. It may be in one or both eyes, but at first it is generally confined to one eye, though it almost always affects both in the end. *Soft C.* is more rare, but occurs in young as well as in old people, and may even be congenital; it is much whiter in colour, and of a semi-fluid consistence. The lens is often enlarged, bulging through the pupil, and not unfrequently adherent to the iris. *Treatment.*—When once C. has commenced nothing will stop its progress, and recourse must be had to an operation. Three modes of this are recommended:—(1) *Extraction* in which the opaque lens is removed through an opening in the Cornea (q. v.). (2) *Depression* or *couching*, performed by inserting Scarpa's needle through the sclerotic about a line from the outer margin of the cornea, and depressing the opaque lens so that the vitreous humour of the eye closes over it and occupies its place, thus allowing rays of light to pass on to the retina. (3) *Solution*, or *absorption*, employed in the case of soft C. It consists in break-

ing up the lens by repeated insertions of a needle, so that the vitreous humour and the lens may come into contact, by which the latter is gradually absorbed. Great care is necessary to prevent the eye becoming inflamed after the operation. The patient requires to use convex glasses. As long as vision remains in one eye no operation should be performed, and only one eye should be operated on at a time.

Catarhi'na (Gr. 'oblique-nosed'), the section of the order *Quadrumana* (q. v.) which includes those monkeys—exclusively confined to the Old World—in which the nostrils are oblique and closely set. The thumbs and great toes are invariably present (with one exception), and the thumb always opposable to the other fingers, so as to convert the hand into a prehensile organ. The teeth are arranged as in man, and thus number thirty-two. The incisors and canines are prominent, especially in the males. The tail is never prehensile, and may be rudimentary. Cheek-pouches and natal callosities are developed. The *Semnopitheci* (q. v.), macaques, baboons, mandrills, gibbons, orangs, gorillas, &c., represent this group, which is the highest in the order.

Catarrh' (Gr. *katarroos*, 'a flowing down') is an inflammation of the mucous membrane of some of the air-passages. It is almost identical with a *cold*. If in the nose, it is called *Coryza*; if in the chest, *Bronchitis* (q. v.). It is one of the commonest of diseases, especially in cold and damp climates. A frequent cause of C. is the sudden change of temperature—*e.g.*, what is experienced in passing from a crowded meeting into the cold evening air. The symptoms are chilliness, lassitude, a slight shivering, pains in the back and limbs, headache, and more or less feverishness. Afterwards there is a copious discharge from the nose, hoarseness, and sore throat, with a foul tongue, and often an eruption about the lips. In simple C. the symptoms generally subside after two days, and the patient gradually gets well; but in more severe cases, the malady leads to bronchitis, inflammation of the tonsils, inflammation of the lungs, &c. *Treatment.*—The patient should be kept warm by means of a Dover's powder, followed by a drink of hot gruel. Bathing the feet in hot water is often beneficial. When a sweating powder cannot be obtained, a good substitute may be made by filling a few black bottles with warm water, putting them in a stocking or a piece of flannel, and placing them along either side of the patient under the bed-clothes. Great care is necessary next day to prevent cold. C. in the head is often cut short by a full dose of morphia, and confinement to the house for two days.

Cataw'ba, Great, a river of the United States, rises in Blue Ridge, waters N. and S. Carolina, and unites with the Congaree to form the Santee, after a course of 250 miles. It gives name to a light sparkling wine, originally made from a wild vine found (1801) near its source, and now extensively produced in Ohio, near Cincinnati. This wine, which has a rich Muscadine flavour, and rivals French wine in delicacy, is much used in the States as a substitute for champagne.

Catbalo'gan, or **Cadvalon'ga**, the capital of the island of Samar, one of the Philippines, has some trade in pepper, rattans, sago, &c. It lies on the W. coast of the island, and consists mainly of Nipapalm-built houses. Pop. 7000.

Cat-Bird (*Turdus fellivox*), a species of Thrush (q. v.), so named from the mewing cry which it utters when alarmed. It is nearly allied to the well-known Mocking-Bird (q. v.), and is confined to America. It feeds upon seeds, fruit, berries, insects, worms, &c., and is by no means shy or timid. The C.-B. migrates southwards in winter, Massachusetts being probably its northernmost limit.

Catch, in music, a short Canon (q. v.), generally humorous, and most often having its words so arranged that when the three parts are sung together their natural meaning is ludicrously altered. The C. seems to exist only in this country.

Catch-Fly, a general name applied to *Silene*, *Lychnis viscaria*, and other plants of the order *Caryophyllaceæ*, which exude at their joints a sticky fluid in which flies are caught. See also DIONÆA.

Câteau (Le), or **Chateau-Cambrésis**, a town in the department of Nord, France, 15 miles E.S.E. of Cambrai, on the Selle, a tributary of the Scheldt, and a station on the Northern French Railway. It has a communal college, a chamber of manufactures, an hospital (*Hôpital Paturle*); manufactures of cotton and woollen yarn, merinoes, cambrics, starch, leather, and earthenware; sugar refineries, distilleries, breweries, tanneries, brass and iron foundries, and a trade in cattle. The *treaty of C.* between France and Spain was signed here in 1559. Pop. (1872) 9254.

Cat'echism (from the Gr. *katēcheō*, 'to instruct,' especially in religion), is a summary of Christian doctrine in the form of question and answer. The requirements of Catechumens (q. v.) no doubt first suggested the preparation of compendiums of the chief points of instruction, for the help both of teachers and pupils; and such manuals have always been employed in the Church, each sect having its own C. for the indoctrination of the youthful members with its own peculiar tenets.

The following are the most important catechisms, prepared by different sections of the Church:—1. Luther prepared two—a Larger, 'for the use of preachers and teachers,' and a Shorter, intended 'for a guide in the instruction of children'—which were published in 1529, and are yet regarded as one of the standards of the Lutheran Church. 2. Calvin also prepared two—a Larger and Shorter—for the use of the Genevan Church, which were published in 1541, and became acknowledged standards of all the Reformed Churches, although the Church of Geneva herself afterwards disowned them. 3. The *Heidelberg C.* is one of the best of the many systems of Christian doctrine constructed during the Reformation period. Originally composed in German by Ursinus, a student of Melancthon and Olivianus, for the Reformed party in the Palatinate of the Rhine, and published in 1562, it has been translated into Latin, Greek, and Hebrew, as well as nearly all the languages of modern Europe. 4. In the Roman Catholic Church—(1) the *Catechismus Romanus* adheres closely to the canons of the Council of Trent, was published in 1566 under the authority of Pope Pius IV., and introduced into Italy, France, Germany, and Poland; (2) the two *C. of Canisius* were published by the Jesuits in order to weaken the influence of the *Catechismus Romanus*; (3) the *C. of Bellarmine*, however, published in 1603, although he also was a Jesuit, was authorised by Pope Clement VIII. 5. Among the Socinians there are to be noted—(1) the *Cracovian C.*, composed by Schomann, and published in 1574; (2) the *C. of F. Socinus*, published in an incomplete form at Racovia, 1618, which formed the basis of (3) the *Racovian Catechisms*—a Larger and a Shorter—published in Polish in 1605, and in Latin 1609. 6. (1) The first C. in use in England consisted of the Creed, the Ten Commandments, and the Lord's Prayer; (2) in the time of Edward VI. there was published (1553) what was known as *King Edward's C.*, entitled 'A Shorte Catechisme, or Playne Instruction . . . . for all Scholemaisters to teach,' and composed by Dr Nowell, then headmaster of Westminster School; (3) under Elizabeth, Nowell, then Dean of St Paul's, and prolocutor of Convocation (1562), was instructed to draw up a C. for the use of schools and students, which was published in 1570, being simply a revised and considerably enlarged edition of his former work; (4) at the Hampton Court Conference this last was considered too long, and, to make what was to be a sufficient C., to the contents of the first (1) mentioned above there was added an explanation of the sacraments. 7. The catechisms used by the Presbyterians of Scotland, as well as by the Presbyterians and Congregationalists in England and America, are the two drawn up by the Westminster Assembly. 8. The C. of the Greek Church, entitled 'The Great Catechism of the Orthodox Eastern Church,' was drawn up by Philaret, Archbishop of Moscow, and published at Moscow in 1839 by order of the Emperor. See Kocher's *Bibliotheca Theol. Symbolicæ*; Hagenbach's *Hist. of Doctr.* (Eng. 1847); and Mosheim's *Church Hist.* (Reid, Edinb. 1860.)

Cat'echu, an extract prepared from the juice of different parts of several plants, containing a large proportion of a modified form of tannic acid, and now extensively employed in tanning and dyeing. Three varieties are recognised in commerce—(1) Black C., Cutch or Terra Japonica, the variety obtained by boiling the wood and twigs of *Acacia C.*, a leguminous tree growing in the East Indies. It comes into the market in dark-coloured amorphous masses, with a glassy fracture and a shining lustre. (2) Gambir or white C. (the *C. pallida* of the pharmacopœia), which is obtained by boiling the leaves of the *Uncaria Gambir*, a plant

belonging to the order *Cinchonaceæ*, native of the Malayan Peninsula. It is imported in the form of cubes of about an inch in size, of a yellowish-brown colour, and a rather earthy appearance, and is more used in pharmacy than in manufactures. The third variety of C. is the produce of the betel-nut, the fruit of the palm *Areca C.*; but little C. from this source comes to Europe. C. is used in the East as a masticatory, along with the betel-pepper leaf. In medicine it is employed as an astringent, but its chief use is in dyeing and tanning and calico-printing. It has also been recommended for use to prevent incrustations in steam-boilers. C. is almost entirely composed of catechu-tannic acid and a basic substance, *catechin*.

Catechu'mens (Gr. *katēchoumenoi*, 'those receiving religious instruction'), in the early Christian Church, were the candidates for baptism, who were put under a regular course of instruction, and were divided into three classes:—1. *Audientes* (hearers), who were permitted to hear sermons and the Scriptures read, but not to stay and hear prayers; 2. *Genuflectentes* (kneelers), who received kneeling the blessing of the bishop; 3. *Competentes*, when their names were delivered to the bishop as candidates for baptism, or *Electi*, if the bishop approved.

Cat'egories (Gr. *katēgoriai*, lit. charges or accusations; then in logic, predicables or forms of predication), the name of the first of six logic treatises that compose the *Organon* of Aristotle. It is uncertain, however, whether Aristotle, or some later Peripatetic, wrote the C. The doctrine of the C., that the 'first essence' is the individual, is opposed to the doctrine of Aristotle's *Metaphysics*, that 'first essences are universals.' In the *Topics* and elsewhere he speaks of the ten C., or 'classes of predications,' sometimes of a smaller number, but always merely in a logical sense. However, Porphyry's *Introduction to the C.* introduced to Europe the great controversy of Nominalism and Realism, in which Aristotelians have taken the side of Nominalism and Platonists the side of Realism. The ten C. are as follow:—(1) Substance; (2) Quantity; (3) Quality; (4) Relation; (5) Action; (6) Passion; (7) The Where; (8) The When; (9) Position in Space; (10) Possession, Habit or Dress. It is clear that this cannot be intended as a classification of existing things except by a philosopher who believes that general terms or ideas have a real existence as well as individual things. Besides, it does not answer to the Aristotelian doctrine that Matter, Form, and Deprivation, or Potentiality and Actuality, were the ultimate Reals. It is probable that the author meant the list to be a rough, unscientific account of all possible predications, not of all describable things; in this view the terms, though not clearly distinguished, are comprehensive enough. Another celebrated deduction of C. was that by Kant in his *Kritik der Reinen Vernunft*:—(1) *Quantity*, including Unity, Plurality, and Totality; (2) *Quality*, including Reality, Negation, and Limitation; (3) *Relation*, including Inherence and Subsistence, Causality and Dependence, Reciprocity; (4) *Modality*, including Possibility and Impossibility, Existence and Non-Existence, Necessity and Contingence. This obviously proceeds on a very imperfect psychological analysis. Perhaps the neatest generalisation of predicables is that of Mr Mill:—(1) Existence; (2) Co-existence; (3) Succession; (4) Causation; (5) Resemblance. Whatever may be affirmed may of course also be denied. The number of C. is naturally extended by those philosophers who maintain that the human mind itself supplies elements of knowledge which are not derived from experience. Kant could not exclude the notion of Necessity from Causation; Hegel could not exclude the notion of Not-Being from Existence; others would insist that Self-Existence is a separate C. In dealing with the Aristotelian C., it should not be forgotten that Aristotle certainly held that Definition was the instrument of Science, and that definitions were not merely of words, but of things.

Cate'nary (Lat. *catēna*, 'a chain'), the curve in which a flexible cord or chain hangs when freely suspended from two fixed points—a curve, therefore, of great importance in the theory of suspension bridges. Its form depends upon the manner in which the mass of the chain is distributed; most of these curves are merely mathematical curiosities, the really important one being that formed by a uniform cord, and known as the common C. The numerous curious properties of this curve are treated of in Poisson's *Mechanics*, Gregory's *Examples*, and Whewell's *Analytical Statics*.

Catenip'ora, a genus of extinct sclerodermic corals found in the *Silurian* rocks of Britain, and of which *C. escharoides* is the most familiar species. The cells of the polypes are of oval shape, and are terminal in position; their arrangement giving a chain-line or network appearance to these fossils.

Cateri'na, Santa, a fortified town in the province of Caltanisetta, Sicily, near the Salso, 22 miles W. of Leonoforte, the present railway terminus. It is noted for its superior earthenware. Pop. 5800. The vicinity is rich in fine jaspers and agates.

Caterpill'ar (Old Eng. *cate*, 'food;' Fr. *piller*; Eng. 'peel'—'a stripper of foliage'), the name popularly applied to the larvæ of *Lepidopterous* insects—that is, of the Butterflies (q. v.) and Moths (q. v.), but occasionally used to indicate the larval stage in the metamorphosis of other insects. The caterpillars of different species present great variations in colour, size, and appearance. Their general appearance is that of worm-like creatures, composed (in *Lepidoptera*) of thirteen segments, and possessing a horny head, provided with antennæ, eyes, and jaws. The mouth, unlike that of the perfect insect, is fitted for mastication or biting. The lower lip or *labium* bears a tubular organ—the *spinneret*—by means of which the larvæ, through the silk secretion furnished by two glands, spins a silken thread to make the *cocoon* or *pupa case*, in which it passes the succeeding or *pupa* stage of its existence. The three joints behind the head correspond to the *thorax* of the perfect insect; and the six legs with which these three joints are furnished correspond to the legs of the adult form. A variable number (usually ten) of soft fleshy legs, known as *pro-legs*, are borne by the hinder segments of the body; but these are characteristic of the C. stage, and have no representatives in the full-grown insect. Pro-legs are never borne by the fourth, fifth, tenth, and eleventh segments of the C.'s body. The digestive system of the C. also differs widely from that of the perfect insect; and the larva also possesses a large mass of a fatty nature termed the *Epiploon* or *fat-mass*, which is doubtless intended to nourish the animal when at rest in its *pupa* or *chrysalis* state. Caterpillars feed voraciously upon the leaves and tissues of plants, and thus cause great damage in gardens. They generally increase largely in size, and frequently moult or change their skins, to accommodate the increasing growth of the body; such a process being known as *Ecdysis*. The C. state may be regarded as representing the *nutritive period* of insect existence, since it is in this state that the animal lays up a due store of nutrition, which in many cases serves it throughout its entire existence. The life—often very short—of the perfect insect is devoted to *reproduction*; we may therefore, in contradistinction, term it the *reproductive period*. The C., sooner or later, encloses its body in a cocoon, and lies dormant for a longer or shorter period as the *pupa*. And from the cocoon the sexual, winged and perfect insect or *imago* finally emerges; the elements of the C. body being metamorphosed into those of the perfect form. In other cases the C. may not enclose itself within a cocoon, but simply attach itself, enclosed within its own skin, by its silky thread to a bush or other fixed object, and may thus undergo the further changes characteristic of its curious existence. See MOTH, BUTTERFLY, INSECT, METAMORPHOSIS, &c.

Cat'gut, the material obtained from the intestines of the sheep, and sometimes from those of the horse, ass, and mule, of which the strings of violins, harps, and guitars, and the strong cord used by clockmakers and in whipmaking, are manufactured. The intestines are prepared by washing, scraping, and steeping, and the larger ones having been laid aside to be sold to the sausage-maker, the smaller ones are treated with an alkaline solution, to render them as clean as possible, and are then drawn through the small holes of perforated thimbles. In making violin-strings, two or more strands are twisted together—according to the required thickness of the string—and the string thus manufactured is then exposed for some time to the action of burning sulphur, to destroy any animal matter that may still adhere, and afterwards rubbed with a horse-hair cloth. The strings made in Italy, and known as Roman string, are the best and strongest. They have the clearness and transparency of glass.

Cath'a. See CAFTA.

Cath'ari (Gr. *katharoi*, 'pure') is a generic term which has been applied to various sects who professed to be 'Puritans' in

comparison with the Church. It was assumed in the 3d c. by the Novatians, who would not receive into the Church persons who lapsed into sin after baptism. It was very generally applied to the Manichæan sects in the middle ages, being nearly synonymous with Paulicians (q. v.) or Albigenses (q. v.), to whom were applied a great number of local names—*e.g.*, Bulgarians, Paterini, Publicani, &c. The name (Puritans) was given to a party in England, which, however, was quite distinct from the Continental sects. See Mosheim's and Neander's *Histories of the Church.*

Cath'arine, St, the name of several saints in the Catholic Church, of whom the best known are—1. **C of Alexandria**, who perished (according to the legend of her life) in the persecution of Maximin, A.D. 307. Her history is hidden under the most extraordinary marvels; it is even doubtful if she can be considered a historical personage at all. In the 9th c. there was discovered, it is said, on Mount Sinai the uncorrupted corpse of a virgin. Popular opinion declared it to be that of the Egyptian martyr, and the place became the scene of frequent pilgrimage. The Crusades made St C. known to the W., and the city of Rouen received her relics. She is commonly represented with a wheel, the instrument with which she was tortured. The Roman Catholic Church celebrates her festival on the 25th of November. 2. **C. of Sienna**, born in 1347, made a vow of chastity in her youth, and lived only on bread and herbs. At the age of eighteen she entered the Dominican order, and astonished every one by the rigour of her mortifications. For three years she imposed silence on herself, conversing only with God and her confessor. But her religion was not mere *egoism*. She was ceaseless in her charities, and in her attentions even to those who were suffering from the most repulsive maladies. Christ, it was affirmed, showed her special tokens of his favour, and Popes, notably Urban VI. and Gregory XI., had recourse to her for advice. She died 29th April 1380, was canonised in 1460, and is commemorated in the Church on the 30th of April. Her letters, poems, &c., have been several times printed. The best edition is that entitled *Opere della Serafica Santa C.* (Siena and Lucca, 1707–13).

Catharine I., Empress of all the Russias, born 15th April 1684, of poor parents, who died when she was three years old. Brought up by the Protestant Bishop of Marienburg, Glück, she married, in 1701, a dragoon of the garrison of that town. The town was taken by the Russians in 1702, and C. was sent with others to Moscow, where, in the service of Prince Menchikoff, she first saw Peter the Great, who made her his mistress. She now dropped her real name. Martha Rabe, was baptized in the Greek Church, and took the name of Jékatérina Alexéievna. After three daughters had been born, Peter married C. on 29th May 1711. She was afterwards crowned at Moscow, 1724; and on her husband's death (1725) she became Empress, Menchikoff taking the charge of affairs. She died 17th May 1727. Her influence upon the passionate character of her husband was generally exerted for good. See Motley's *History of the Life and Reign of C. I.* (2 vols. Lond. 1744); Voltaire's *Histoire de Russie sous Pierre le Grand* (1759 63); and Arsenjew's *Zarstwowanie Ekateriny I.* (Petersb. 1856).

Catharine II., born at Stettin, 2d May 1729, was the daughter of Christian August, Prince of Anhalt-Zerbst, an officer in the Prussian army. After receiving an unusually good moral training from her mother, who belonged to the Holstein-Gottorp family, she was married in 1745 to the Russian Emperor, Peter III., or Feodorovitch, who, also a member of the Holstein-Gottorp family, had been adopted by the Empress Elizabeth. It was a marriage of a beautiful, intelligent, and high-principled woman to a cowardly and vicious fool, deeply marked with small-pox. C., while Grand-Princess, lived rather apart from her husband and the Empress, studied much, and became acquainted with the character of the people, their language, religion, &c. In 1754 a son, Paul Petrovitch, was born; in 1761, hatred of his father, who was a slave of Friedrich II., caused a conspiracy to place the boy on the throne. The next year, but after the death of Elizabeth, the great conspiracy of the Orlofs and Rasumofski secured the throne for C., and her husband's abdication. Peter, whose only friend was the upright Field-Marshal Munnich, died soon after. C. recalled many exiles from Siberia, punished official corruption, and reformed judicial procedure. Though her reign was not free from conspiracy, she destroyed the system of court intrigue, and devoted herself to the absorption of Poland into Russia and the diminution of Turkish power. The means she used to attain these objects showed that her public conscience as well as her private character had deteriorated at the Russian court. Poland she deprived of Courland, and then placed on the throne her creature Poniatowski. To the promotion of the internal prosperity of the empire she energetically addressed herself. She tried to codify the laws, introduced a better provincial administration, improved the condition of the serfs, constructed canals, and herself set the example of vaccination. She also founded the Russian Academy, corresponded (like Friedrich the Great) with Voltaire, and invited Diderot and D'Alembert to her court. But while herself superintending public affairs with unequalled skill and sagacity, she entered into a number of disgraceful amours with Russian nobles, of whom only Orlof and Potemkin attained to political importance. She died 17th November 1796. Her popularity may be seen in the correspondence with Voltaire, which fills vol. lxxxviii. of his collected works. He calls her 'the Aurora Borealis of the N.,' and subscribes himself, 'with idolatry, the Priest of your Temple' (22d December 1766). See Castera's *Histoire de C. II.* (3 vols. Par. 1800), and Herzen's *Mémoires de l'Impératrice C. II.* (Lond. 1859).

Catharine of Aragon, born December 1485, was the fourth daughter of Ferdinand and Isabella of Castile and Aragon. She was first married, with a large dowry, to Arthur, eldest son of Henry VII. of England, and afterwards, on 3d June 1509, to Henry VIII., who had been betrothed to her when a boy of twelve immediately after his brother's death in 1502, at which time also, C. not being pregnant, a dispensation for the second marriage was reluctantly granted by Pope Julius II. C. unfortunately disappointed the King and the nation, who were expecting a male heir, the Princess Mary being the only child of several who lived beyond a few days. In 1527 Henry accordingly declared that the safety of the realm required a divorce. This was only a preliminary to another marriage, Anne Boleyn being already singled out as C.'s successor. A dispensation was craved from Pope Clement VII., and next year Anne was openly installed at Greenwich. The cause being appealed to Rome, Clement inhibited Henry from proceeding further with his second marriage, and Henry appealed from the Pope to the general voice of Christendom on the question of the extent of the Pope's power of dispensation. C. declined to submit her cause to arbitration in England, and retired to The More, in Hertfordshire, and latterly to Ampthill, near Dunstable, where she became a centre of communication between the courts of the Continent and the disaffected parties in England—the Nun of Kent, the Poles, the Courtenays, the Nevilles, &c. In 1533 the Statute of Appeal (24 Hen. VIII. c. 12) was passed, excluding appeal to Rome in all matrimonial causes; and after the Houses of Convocation had delivered their opinions on the question of Levitical law, Archbishop Cranmer opened a court at Dunstable to try the matter of fact regarding C.'s first marriage. The judgment (22d May 1530) was never acknowledged by C., who was now called Princess-Dowager: it was afterwards set aside by the Act 1 Mary, c. 1, when it became necessary to set the legitimacy of C.'s daughter beyond doubt. There seems little doubt that C. was implicated in the conspiracy of the Nun of Kent: she constantly corresponded with the Emperor and the Pope on the subject of her divorce. The removal to a distance of the Princess Mary no doubt hastened C.'s death, which took place, 7th January 1536, at Kimbolton. See Froude's *History of England*, and *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII.*, by J. S. Brewer (1875).

Catharine de Médicis, born at Florence in 1519, was the daughter of Lorenzo de' Médici, Duke of Urbino, and the niece of Pope Clement VII. She was great-granddaughter of Lorenzo the Magnificent, and granddaughter of Leo X. In 1533 she was married to Henri, second son of François I., who was then hesitating between Lutheran alliances against Karl V. and Papal influence in his project of acquiring Milan. Partly because for ten years there were no children of the marriage, C. remained for a long time eclipsed by her husband's mistress, Diana of Poitiers, and the influence of the Guises. She was, however, a favourite with her father-in-law. Henri succeeded his father in 1547, and died himself in 1559. The following were the children of the marriage:—François, Dauphin, who married Mary Stuart, and reigned as François II. for a year; Charles IX., who reigned 1560–74; Henri III., who reigned 1574–89; François, Duke of Alençon, for sometime sovereign of the united provinces of

Holland, and a suitor of Queen Elizabeth; Elizabeth, who married Philip II. of Spain; Claude, Duke of Lorraine; and Marguerite, who married Henri of Navarre. C. became Regent on the accession of her son Charles, and, pretending to favour the Huguenots, formed a party, including the Chancellor L'Hôpital, Condé, and Antoine of Navarre, against the faction of François of Guise and the Cardinal Lorraine. After the two religious wars ended, C., seeing the Paris mob decidedly Catholic, made overtures to the Guises, and arranged the murder of Coligny and the massacre of St Bartholomew. Coligny's influence over Charles IX. was considered dangerous. During the reign of Henri III., the Catholic League, formed by Henri (Balafré) of Guise and Charles of Guise, Duke of Mayenne, which supported the claim of Cardinal Bourbon to the throne, became too strong for C., as was shown on the Day of Barricades and the King's flight to Chartres. This caused C. to form an alliance with Henri of Navarre. Before the siege of Paris, she died at Blois, 5th January 1589. C. appears to have been beautiful in person, of graceful manners, and of great personal courage. She conducted state correspondence. Morally, she was cruel, licentious, and basely treacherous. In religion she was abjectly superstitious on particular points.

Catharine's, St, College or **Hall**, Cambridge, was founded in 1473 by Robert Woodelarke, for a master and three or more fellows. The number of the latter was increased in 1860 to nine. There are twenty-five scholars, and six benefices in the gift of the college. In 1875 the number of undergraduates was fifty-seven.

Catharis'tæ, a local name for the Manichæans (q. v.).

Cathar'tics (from the Gr. *kathairō*, 'I purify') are medicines that increase the discharge from the bowels. They act by increasing either the peristaltic action of the bowels, or the watery secretions of the intestines, or in both of these ways. Some operate on a certain portion of the bowel only, others on the whole canal. C. often cause griping, which is best prevented by henbane or belladonna, or by any of the warm aromatics, as cinnamon, ginger, or pepper. They should be administered on an empty stomach, and their action is assisted by warm drinks and walking exercise. Mild C. are often called *laxatives*, and strong C. *purgatives*.

Cathar'tine, a name formerly given to what was considered the active principle of senna. It is now, however, applied to the active principle of Cathartics (q. v.), and is supposed to be identical with chrysophanic acid ($C_{10}H_8O_3$), which occurs in yellow needle-like crystals, is without odour, nearly tasteless, insoluble in cold water, but soluble in alcohol and ether. It is found in senna, rhubarb, and other vegetables.

Cathcart', William Shaw, Earl, a British politician and general, and son of Baron Cathcart, of Cathcart, Renfrewshire, was born September 17, 1755. Entering the army, he served with distinction in America, Germany, and Flanders, was made commander-in-chief in Ireland in 1803, and commanded the land forces in the attack on Copenhagen, receiving the thanks of Parliament and the dignity of Viscount, 1808. He subsequently acted as ambassador at the Russian court, was present at the congresses of Châtillon and Vienna, and was raised to the rank of Earl in 1814. He died, June 17, 1843, at his country residence, Cartside, near Glasgow. His eldest son, **Charles Murray, Earl C.**, born 1783, served in Spain and Canada, and was made a general and colonel of the 1st Dragoon Guards. He died July 1859.—**Sir George C.**, younger son of Earl William, was born in London, 1794, and educated at Eton and Edinburgh. He entered the Life Guards, fought with the allied army in 1812 and 1813, and was aide-de-camp to the Duke of Wellington at Quatre-Bras and Waterloo. His subsequent career was distinguished. In 1837 he was mainly instrumental in crushing the outbreak in Canada, where he remained for upwards of six years; and in 1852, being sent to the Cape of Good Hope as governor, was successful in bringing the Kaffir war, then raging, to a conclusion. C. went, in 1854, to the Crimea as a general of division, fought at Alma, and at Inkermann met a soldier's death, the place where he fell being known as C. Hill. He was the author of *Commentaries on the War in Prussia and Germany in* 1812 *and* 1813, published in 1850. After his death appeared C.'s *Correspondence relative to his Military Operations in Kaffraria* (Lond. 1856). See Kinglake's *History of the Invasion of the Crimea.*

Cathe'dral Church is the see or seat of a bishop, and is so called from his seat or throne (Lat. *cathedra*), which is placed in it. The clergy connected with a C. consist of a corporation of canons, called a chapter, presided over by the bishop. The cathedrals in England are divided into two classes, namely, of the old and of the new foundation. The latter are those which before the Reformation were monastic institutions, but at that period were refounded as secular cathedrals, that is, with clergy to minister to the laity, or were newly-created sees of that nature. Their chapters consist of residentiary canons, who, till the Act of 1840, were called prebendaries. The former are those which were always held by secular canons. Their officials now consist of dean, precentor, chancellor, treasurer, archdeacons, prebendaries, and canons. In reference to the building, see CHURCH. See Walcott's *Sacred Archæology* (1868).

Cathelectroto'nus is the physiological condition of a nerve in the neighbourhood of the *negative* pole, when it is stimulated by a constant current of electricity. For details see ELECTROTONUS.

Cathelineau, Jacques, leader of the Vendéan insurrection, was born at Pin-en-Mauges (Maine-et-Loire), 5th January 1759. Originally a mason, he afterwards became a pedlar, and acquired great influence in the country districts by his intelligence and piety—the people reverentially naming him *Le saint de l'Anjou.* The immediate cause of the revolt against the revolution was the levy of 300,000 men for the frontier wars. It broke out, 12th March 1793, at Saint-Florent-le-Vieil in the Bocage. C. instantly put himself at the head of the rustics of his parish, mostly armed with scythes, pitchforks, and sticks, captured the village of Chemillé on the 13th, and on the day following took Chollet, capital of the Bocage, where his followers obtained some artillery. Their numbers now rapidly increased, and a large, though undisciplined army, *La grande armée Vendéenne*, was formed. The victories of Vihiers (16th March), of Saint-Pierre de Chemillé (11th April), of Thouars (5th May), of Fontenay (25th May), of Doué (7th June), of Montreuil (8th June), and, above all, of Saumur (9th June), strikingly attest the bravery and the military aptitude of C., who was now chosen commander-in-chief of the 'Catholic and royal' forces. His career, however, was suddenly closed. At the siege of Nantes (30th June), where he displayed prodigies of valour, he was mortally wounded, and after lingering fifteen days, died at Saint-Florent, 14th June 1793. His three brothers, Jean, Pierre, and Joseph, also perished in the Vendean war, and his son, **Jacques**, born 28th March 1787, was shot 27th May 1832, during the abortive insurrection of the Duchesse de Berry. See Muret's *Vie Populaire de Cathelineau* (Par. 1845).

Cath'eter (from the Gr. *kathiēmi*, 'to thrust into'), a surgical instrument for passing along a mucous canal into some cavity of the body, either for the purpose of drawing off or injecting some fluid. It is generally used for drawing off the urine when from accident or disease the patient is unable to pass it. C. may be of metal, in which case it is generally plated with silver, india-rubber, or gum-elastic. Considerable dexterity is required by the surgeon to pass the instrument into the bladder without injuring the Urethra (q. v.). See URINE, RETENTION OF.

Cathetom'eter (from the Gr. *kathetos*, 'perpendicular,' and *metron*, 'a measure'), an instrument for measuring the change in the height of an object situated at some distance off, especially with reference to a column of liquid in a tube. It consists essentially of a tripod stand and an upright brass rod, to which a telescope is so attached at right angles that it is capable of being fixed at any part of the rod, and of being pointed in any direction. The rod is adjusted to a true perpendicular position by means of spirit-levels and screws, and this secures the perfectly horizontal position of the telescope.

Cath'ode. See ANODE.

Cath'olic Church (Gr. *katholikos*, 'universal') means the universal Christian Church; the term having been first employed to distinguish it from the Jewish Church, which was that of a single nation, and cannot therefore properly be appropriated by any section of it. In the popular mind, however, C. C. is synonymous with Roman C. C. (q. v.), as, on the other hand, the Roman C. C. is equivalent to the C. C. according to the members of that Church, who regard it as the only one deserving the name of Church.

Catholic Creditor. In Scotch law, a catholic or universal creditor is one whose debt is secured over several subjects, or over the whole subjects belonging to his debtor. A creditor so secured is bound to claim his debt according to certain equitable rules, so as not unnecessarily to injure the claims of postponed creditors.

Catholic Emancipation was, as Sydney Smith said, an Irish question. Originally the provisions of the Irish Act of Supremacy, 2 Eliz. c. 1, were really less unjust towards Catholics than those contained in the English Act 1 Eliz. c. 1, supplemented by 5 Eliz. c. 1. Thus, in England, a Catholic priest receiving a neophyte into the Church was liable to be hanged, drawn, and quartered; Jesuits forfeited their lives by appearing in the country; and no man could hold office, or become a barrister or schoolmaster, without taking the oath of supremacy. In Ireland these penalties did not exist; the sacramental test and the declaration against transubstantiation were unknown; the oath of supremacy was not exacted, and neither House of Parliament was closed against any religious sect. There was, however, the bitterest political oppression, which at last found expression in the Act of the English Parliament (1691) providing that no person should sit in the Irish Parliament, should hold any Irish office, civil, military, or ecclesiastical, or should practise law or medicine in Ireland, till he had taken the oaths of allegiance and supremacy, and subscribed the declaration against transubstantiation. This statute, 3 Will. and Mary, c. 2 (which was based on the Treaty of Limerick), was followed by the penal legislation against Irish Catholics, which led to so much misery during the 18th c. that Lord Chesterfield declared that the position of a negro slave was preferable to that of an Irish Catholic. At one time (1698) the bishops, dignitaries, and regular clergy were all banished. The right of guardianship, several rights in land, intermarriage with Protestants, and the two franchises were taken away from Catholics. In 1793, after Grattan had introduced the subject to the Irish Parliament, several pains and penalties were removed, but for that purpose the Catholics were obliged to take the oath drawn up by Dr Duigenan, to the effect that it was unlawful to injure persons on account of heresy; that no immoral act could be justified because done for the good of the Church; that the Pope's infallibility was not an article of Christian faith; that, therefore, it was sinful to obey commands of the Pope which were immoral; that sincere repentance, and not mere priestly absolution, was necessary for forgiveness; that the deponent would defend the then settlement of property in the kingdom, and would do nothing to subvert the Church established or the Protestant religion. The main political disabilities remained, although Lord Fitzwilliam's viceregal government and Mr Pitt's ministry of 1801 both came to a termination on account of differences on this question. In spite of the answer given to Mr Pitt by six Catholic universities, and of the fact that Catholics were competent as jurymen and witnesses, it was maintained that Catholics did not keep faith with heretics. The Irish Union was accomplished on the understanding that the Catholic claims would be conceded, but the scruples of George III. and George IV. about their coronation oaths, and the conscientious opposition of the Duke of Wellington, Peel, Lord Eldon, and other members of the Tory party, delayed even the parliamentary discussion of the question. In 1821 a bill passed the Commons by a majority of nine for admitting Catholics to the Lower House, and in 1822 a bill to admit Catholic peers to the Upper House passed the Commons by a majority of five. In the meantime the Catholic Association had been formed, and won a great victory in the election of the Catholic O'Connell for County Clare over Fitzgerald, the Protestant candidate—the first triumph of the 40s. freeholders over the great landed proprietors. O'Connell could not, of course, take his seat, but in 1828 Peel was obliged to take up the cause which Canning had so long maintained, and to introduce a general bill, admitting Catholics generally to offices and municipal rights, modifying the oath required to one of general allegiance, but continuing the exclusion as to all offices connected with the Church. To all commands in the united services they had been admitted previously. At the same time the 40s. freehold franchise was destroyed, and the Catholic Association legally, but not actually, suppressed. There does not seem to have occurred any difficulty in working this measure. The English Government has not interfered with the nomination of bishops or the publication of rescripts. A question was raised about ecclesiastical titles in 1854, and the publication of a bull in 1870 on Papal infallibility caused a warfare of pamphlets, but no serious conflict between the 'two allegiances' has yet occurred.

Catholic Epis'tles is the name given to the last seven epistles of the New Testament, because they were addressed to the general body of Christians (Gr. *katholikos*, 'universal') rather than to a particular church or person; or perhaps also because this name, confined at first to 1st Peter and 1st John as books *universally* received, was afterwards extended to the other five, which were not received by all as authentic when they were admitted into the canon.

Cathol'icos (Gr. *katholikos*, 'universal') is the title of the Primate of the Armenian Church, who resides at Etchmiazin.

Catholics, Roman, Laws as to. See ACT OF TOLERATION.

Catili'na, Lucius Sergius, descended from an old but impoverished family, was born about 109 B.C. From his early youth he was guilty of fearful atrocities, boundless extravagance, and open indulgence in every vice. Though he bore the reputation of murdering his wife and son that he might wed the rich and reckless Aurelia Orestilla, he was elected prætor 68 B.C. and governor of Africa in the following year. In 66 B.C. he was impeached by Publius Claudius Pulcher for oppression, and disqualified for the consulship. Mad with chagrin and harassed with debt, he formed the design, with Autronius and Cn. Calpurnius Piso, of murdering the new consuls—a scheme which failed solely through his own impatience. When the storm passed over, C. began to plan a new conspiracy on a stronger, surer, and more systematic basis. In 64 B.C., in his canvass for the consulship, he threw out hints about the grand venture. Senators, knights, and others, needy and desperate like himself, joined in the plot, which soon assumed vast proportions, and would have led to the ruin of the state but for Fulvia, the mistress of one of the conspirators, who divulged it to Cicero. Meanwhile C. lost the consulship, and in 63 B.C. formed a plan for Cicero's assassination, which was frustrated. On the night of the 6th November, C. met the ringleaders at the house of M. Porcius Laeca, and informed them of the disposition of his forces and the arrangements for Cicero's assassination, an insurrection of the slaves, and the firing of the city. Cicero was at once advised by Fulvia of this, and when the assassins came they were refused admittance. On the 8th November the Senate, for greater safety, met in the temple of Jupiter Stator. C. was present. Cicero with the first sentence paralysed the traitor, who at dead of night fled the city. C. and Manlius were declared enemies of the state, and Antonius was sent against them with an army. Cicero, who was left in Rome, caused Lentulus, Cethegus, and others to be arrested. They were tried, condemned, and strangled in prison. C. meanwhile had led his forces into the region of Pistoria, with the intention of crossing into Gaul, but in this he was foiled by Metellus Celer. In the beginning of 62 B.C., he fell in battle with Petreius, the lieutenant of Antonius, fighting desperately to the last.

Cat'kin, or **Ament** (*amentum*), a botanical term applied to a spike of unisexual flowers, behind scaly bracts instead of a proper perianth. The whole inflorescence falls off by an articulation in a single piece. Willows, hazels, oaks, birch, alders, &c., and the whole of the orders *Cupuliferæ* (q. v.) and *Amentaceæ* (q. v.)—though in some, as the oak and hazel, only the male flowers are in catkins—are distinguished by this inflorescence.

Cat'mint, Catnep, or **Catnip** (*Nepeta Cataria*), a plant of the natural order *Labiatæ*, so called from the fondness of cats for it, common in England, but rare in Scotland. There are various other species in Southern Europe and temperate Asia. Malabar C. is *Anisomeles malabarica*.

Ca'to, Dionysius. Whether or not there ever was a writer of this name is a matter of uncertainty. The little book bearing the title *Dionysii Catonis Disticha de Moribus ad Filium* has exercised the ingenuity of scholars for ages, and its authorship, its period, and its merits are alike unsettled. Seneca, Ausonius, Boethius, and many others have enjoyed the reputation of writing it. One has declared its style to be that of the best period, another, that of the worst, in Roman literature; its precepts have

been pronounced splendid by some; by others, the veriest rubbish. One considers the author an earnest Christian; another, a rank Pagan. It would seem that a work which has been the theme of so much discussion must have some merit. On internal evidence we may safely ascribe it to a writer of the silver age. During the middle ages it was extensively used as a text-book. It was translated into English by Caxton. The editions of it are numerous; the best is that of Otto Arntzenius (Amst. 1754).

Cato, M. Porcius, surnamed *Censorius*, from his strictness during his censorship, known also by the names of *C. Major* and *C. Priscus*, was born at Tusculum, 234 B.C. His boyhood was, in great part, spent on his father's estate in Sabinum, where he accustomed himself to outdoor exercises, and, by joining in farming operations, acquired that knowledge of rural economy which he afterwards gave forth in his work *De Re Rustica*. His early ambition was kindled by tales of the career of M. Curius Dentatus, whose humble cot was in the neighbourhood. In the campaign of 217 B.C. he began his military career; was at Capua in 214 B.C., where he gained the friendship of Fabius Maximus; was present at the siege of Tarentum 209 B.C., and two years later helped to win the battle of the Metaurus, in which Hasdrubal was slain. Meanwhile he had made the acquaintance of L. Valerius Flaccus, a young nobleman of kindred sympathies, who, recognising his signal ability, urged him to proceed to Rome and aspire to forensic and magisterial honours. C. did so; distinguished himself as a pleader; became quæstor 204 B.C., ædile 199 B.C., prætor 198 B.C., and in 195 B.C. was elected consul with his friend Flaccus. During his campaign in Spain, which had been assigned as his province, C. displayed great military genius and acted with consummate ability. He shared the food and toils of a common soldier, and inculcated the sternest morality. Having reduced the country from the Ebro to the Pyrenees, he was decreed a thanksgiving of three days. In 194 B.C. he returned to Rome, where he was awarded the honours of a triumph. In 191 B.C. he went to Greece as military tribune under M. Acilius Glabrio against Antiochus, and distinguished himself at the battle of Thermopylæ, which led to the downfall of the Syrian king. This ends the military career of C. In 189 B.C. he stood for the censorship, an office which he did not obtain till 184 B.C., when Flaccus was again his colleague. So vigorous was he in the discharge of the duties of that office, that the epithet *censorius* stuck to him ever after. His severe edicts against luxury, and his improvements in the reservoirs, drainage, &c., did much for the welfare of the people. His native austerity led him to denounce the literature of Greece as dangerous to morals, but this prejudice diminished as he grew older. C.'s censorship was rewarded with a public statue, bearing an inscription recording his services. To the end of his days his life was one of ceaseless activity. In the year before his death he was the most vehement adviser of the third Punic War, and so violent and persistent was his hatred of Carthage, that, whatever was the subject of debate in the Senate, he always concluded his remarks with the famous words, 'Delenda est Carthago' (Carthage must be destroyed). C. died at the age of eighty-five, B.C. 149. He was twice married, first to Licinia, and then to Salonia, who, in his eightieth year, bore him a son, M. Porcius C. Salonianus, the grandfather of *C. Uticensis*. His principal writings were *De Re Rustica*, already mentioned; *Origines*, an historical work; and *Orations*. Of the last two, only fragments remain.—**Marcus Porcius C.**, great-grandson of the preceding, and surnamed *Uticensis* from his death at Utica, was born 95 B.C. Left an orphan in childhood, he was brought up by his uncle, M. Livius Drusus. As a boy he was demure and unsocial, but truthful and independent. In 72 B.C. he served with honour in the Servile war of Spartacus; but, though a brave soldier, he lacked military genius. In 67 B.C. he went as military tribune to Macedonia, whence he proceeded to Pergamus in search of the Stoic, Athenodorus, whom he induced to accompany him to Macedonia, and afterwards to Rome. C. soon obtained the quæstorship, the duties of which he discharged with universal approbation. In 63 B.C. he was elected tribune. He supported Cicero against the Catilinarians, and determined the wavering Senate by his speech, in which he taxed Cæsar with complicity in the plot. He strenuously opposed Cæsar's election to the consulship, as well as the decree of the Senate by which he obtained Gaul for five years. He was sent to Cyprus against Ptolemy, and compelled him to submission. C. vigorously resisted the triumvirs; was made prætor B.C. 54, but failed in his candidature for the consulship. When Cæsar crossed the Rubicon, the Senate, on his recommendation, gave Pompey the conduct of affairs. C. followed Pompey to Dyrrachium, 49 B.C., and after the battle of Pharsalia, 48 B.C., commanded the Corcyrean fleet. Hearing of Pompey's death, he repaired to Africa, and marched through Libya to effect a junction with Scipio, to whom he resigned the command. On the defeat of Scipio at Thapsus, 6th April, 46 B.C., C. fortified himself in Utica, and urged the Romans to hold out, but they quailed at Cæsar's approach. Finding resistance hopeless, he advised his friends to escape and make terms with the conqueror. But he had made up his mind to die rather than submit, and, after reading Plato's *Phædo*, stabbed himself.

Cat'odon. See CACHALOT.

Cat-o'-Nine-Tails. See FLOGGING.

Catop'trics, a term, now disused, for that branch of Optics (q. v.) which treats of reflected light.

Catop'tromancy (Gr. *katoptron*, 'a mirror,' and *manteia*, 'divination'), among the ancient Greeks, a mode of divination by immersing a mirror in water for a sick person to examine his face in. A ghastly and distorted reflection portended death; a serene and healthy one, recovery.

Cat's Eye, a variety of chalcedony, commonly translucent, sometimes transparent; of an ash-grey, greenish, yellowish, reddish, or brown colour, and displaying, when cut in a convex form, a peculiar floating opalescence, due to minute parallel fibres of asbestos. It is found in Ceylon, on the Malabar coast, and in several European localities. It is chiefly set in rings.

Cats, Jakob, a Dutch poet, born at Brouwershaven in Zealand, 10th November 1577, studied law at Leyden, visited Orleans and Paris, and settled at Middelburg, where, amid other peaceful occupations, he wrote a number of his best poems. After the twelve years' peace of Antwerp, C. was compelled to remove to the Hague. He was appointed pensionary of Dordrecht in 1625, and two years later was sent on an embassy to England, where he was knighted by Charles I. In 1636 he was promoted to the dignity of state pensioner, and in 1652 was again sent to England on an embassy to Cromwell. He died September 12, 1660. Among his greatest works are *Hauwelyk*, *Trouringh*, and *Spiegel van den ouden en nieuwen Tyt*. The best edition is that of 1790-1800, published in Amsterdam; but the most splendid edition is that published at Zwolle in 1856-62.

Cat'skill or Cau'terskill Mountains (*kill* in Dutch means a stream), celebrated for their fine scenery, rise to the W. of the Hudson, in Greene Co., N.Y. Round Top, the highest peak, is 3800 feet above the sea. The C. Mountain House, a summer resort, stands at a height of 2500 feet. The C. Creek, giving name to the mountains, and to a village at its mouth, enters the Hudson 32 miles S. of Albany.

Cat's Tail. See ZYPHA.

Cat's-Tail Grass. See TIMOTHY GRASS.

Catt'aro, a fortified town in the crown-land of Dalmatia, Austria, 36 miles S.E. of Ragusa, at the head of the Gulf of C., on a narrow ledge at the base of precipitous cliffs about 1800 feet high. It has a cathedral, several churches, an hospital, and is overlooked by a castle perched on the top of the cliffs, with which it is connected by crenelated walls. As in most Dalmatian towns, no vehicle is admitted within the walls, and the streets are cleanly kept. The piazza is beautifully paved with alternate coloured marbles. Pop. estimated (1872) 3554. At an early date the capital of a small republic, C., through fear of the Turks, voluntarily submitted to the Republic of Venice in 1420, and passed with it to Austria in 1797, at the Peace of Campo-Formio.—*C., Gulf of*, a sheltered inlet of the Adriatic, consisting of three basins, connected by two channels about half a mile broad. It is 15 to 20 fathoms deep, and 30 miles long.

Catt'egat ('the cat's throat,'—the *Sinus Codanus* of Pliny and Pomp. Mela), the strait between Jutland and Sweden, communicating with the North Sea by the Skager Rack, and with the Baltic by the Sound, and by the Great and Little Belt. It is about 150 miles long, and from 40 to 95 broad, and is

dangerous to shipping from its storms, currents, and shallowness; hence the Low German proverb, *Dat Cattegat makt den Schippa den Hals natt.*

Catt'ermole, George, born at Dickleburgh, Norfolk, 8th August 1800, early attained a high reputation as a painter of historical and imaginative works in water-colour, ceased to exhibit in 1853, after which he commenced to paint in oil. He died July 24, 1868. Among his works are 'Luther at the Diet of Spiers,' with thirty-three portraits, and the 'Horn of Egremont Castle.' He found many subjects in the works of Scott and Shakespeare, and designed the illustrations for his brother's *History of the Civil War.* See memoir by Tom Taylor in *Art Journal*, March 1, 1870.

Catt'i, or **Chatti**, a warlike German tribe, the chief sept of the Herminones, occupying territory corresponding to the modern *Hessen* (a form of the name C. first appearing in the 8th c.), and perhaps part of Bavaria. Cæsar erroneously classes them as belonging to the Suevi. The Romans gained many advantages over them, especially under Germanicus, but never entirely subdued them. They disappear from history towards the close of the 4th c., after which time they are not to be distinguished from the Franks.

Cattle. See Ox.

Cattle-Plague. See RINDERPEST.

Cattley'a, an extensive genus of Central American and Brazilian orchids, found on the bark of trees and on rocks. The flowers are among the finest of the whole order, and many species of C. are cultivated in our conservatories.

Cattol'ica, a town of Sicily, province of Girgenti, situated 14 miles N.W. of Girgenti city, with considerable sulphur-works. Pop. 7200.

Catull'us, C. Vale'rius, one of the greatest of Roman poets, was born at or near Verona, 87 B.C. His father was a man of good position, and the friend and host of Julius Cæsar. On assuming the manly gown, C. went to Rome, where he led the life of a man of pleasure. His expensive tastes and reckless extravagance soon involved him in pecuniary difficulties, from which he endeavoured to extricate himself by going to Bithynia in the suite of the prætor Caius Memmius Gemellus. Thereafter he made a tour of the famous cities of Asia, and on reaching Amastris, on the shore of the Euxine, had a yacht built for himself, in which he sailed home to his villa at Sirmio on the Lacus Benacus (*Lago di Garda*), probably about 56 B.C. He now made Rome his headquarters, and though occasionally in pecuniary embarrassments, he was not reduced to permanently straitened circumstances. He lived on terms of intimacy and friendship with many of the most distinguished men of his time. But the one event in his personal history to which a thrilling interest and an immortal freshness have ever attached, is his love for the beautiful and dissolute Clodia, whom he has immortalised under the pseudonym of Lesbia. In that wondrous series of poems, the tender emotions of dawning love, the wild throbbings of desire, the fulness of delight that springs from undoubting and undoubted affection, the dark nightmare of jealousy, and the desolation of a heart torn by mighty anguish, are all embalmed in musical numbers unparalleled in the poetry of passion. Next to his love in interest, and sung in strains not inferior to his love-lyrics in sincerity and depth of feeling, is his sorrow for the death of a dearly-loved brother, who perished in the Troad, and to whose grave he made a pilgrimage. Indeed, the verses to his memory are among the tenderest and sweetest, as they are among the very earliest flowers of Roman elegy. The works of C. consist of 116 poems, most of them short, embracing lyric, elegiac, heroic, and galliambic compositions. The most famous of them after the Lesbia series are two epithalamia, the stately narrative poem on the nuptials of Peleus and Thetis, the gorgeous setting of the *Lament of Ariadne*, and the wildly-grand poem entitled *Atys*, which, though perhaps of Oriental birth, evinces more originality and vigour than any other poem in Latin literature. The writings of C., in many places disfigured by impurity of expression—the fault of the age rather than of the man—are throughout distinguished for great purity of style, rare intensity of feeling, inimitable elegance and grace, and singular felicity of diction. To C. belongs the honour of naturalising in Roman speech the lyrical metres of Greece. Few of the poets of antiquity have the freshness, few continue to enjoy the well-deserved popularity, of 'the young gentleman of Verona.' The exact time of his death is unknown, but it may be set down at about 46 B.C. The best editions of his works are those of Lachmann (Berl. 1829), Doering (Altona, 1834), Schwabe (Giessen. 1866), and Ellis (Lond. 1867). Among translations may be mentioned those of Lamb (Lond. 1821), Martin (Edinb. 1861), Cranstoun (Edinb. 1867), Ellis (Lond. 1867).

Cau'ca, a river of the United States of Colombia, S. America, rises in the Andes, and after a course of fully 500 miles through Popayan, Antioquia, and Cartagena, falls into the Magdalena in lat. 9° 25′ N. The valley of C., to which the river gives its name, is fertile and populous, with gold-mines in its upper portion.

Cauca'sian Variety of Mankind, an ethnological division introduced by Blumenbach, but now universally abandoned. The evidence of language forbids the conjunction in one group of Hindus, Persians, Assyrians, Phœnicians, Jews, the peoples of the Caucasus, and the European races. These constitute at least three distinct families—Aryan, Semitic, and Turanian. See ETHNOLOGY.

Cau'casus, The, an important mountain range, forming part of the boundary line of Europe and Asia, extends from S.E. to N.W. between the Caspian and the Black Sea. It is 750 miles long, and from 65 to 150 broad; and its principal heights are Mount Elbruz, 18,493 feet above the sea, and Mount Kasbeck, 16,000 feet. The snow-line is about 11,000 feet high, and several of the other peaks rise above it; but there is comparatively little perpetual snow, and only a few glaciers, and these of no great size. The only practicable carriage-road is that through the Terek valley (8000 feet), and the most frequented pass in the E. is that of Derbend, near the Caspian. Of the rivers rising in the C., the principal are the Kur and Terek, which flow into the Caspian, and the Rion or Faz (anc. *Phasis*) and the Kuban, which enter the Black Sea. The central mass of the C. is mainly formed of granite and porphyry, covered occasionally with volcanic tuff, and the offsets are in several places flanked with limestone. At each extremity of the range occur mud volcanoes, and the peninsula of Apsheron is the locality of the celebrated naphtha springs. The minerals found in the C. are chiefly iron, coal, sulphur, lead, and copper. In the wilder parts there are bears, wolves, jackals, and bisons, and almost everywhere there is abundance of game. On the northern declivity the climate is extremely rigorous, but to the S. of the range it is warm and equable, and there is a luxuriant wild growth of the grape and other fine fruits. Only the lower valleys are wide and cultivatable. These, however, produce rich harvests of rice, tobacco, cotton, indigo, &c., while cereals are occasionally grown at an altitude of 8000 feet. Here and there the mountain-sides are clad with dense forests of oak, beech, ash, maple, walnut, and other trees.

C. is now a Russian lieutenancy, with an area of 7938 sq. miles, and a pop. (1871) of 4,893,332, comprising a vast variety of tribes, of which the principal are Circassians or Tsherkesses, Ossestes, Lesghians, Abasians, Georgians, and Mingrelians. The chief occupations are cattle-rearing and agriculture, while there is also much hunting, and not a little robbery. From the preponderance of the Circassians (q. v.), their name is frequently applied to all the inhabitants of the C., but this is inaccurate and misleading. The language of intercommunication is Turkish-Tartar, and there are upwards of 100 different dialects. Mohammedanism is the prevailing religion, but the Georgians and Ossestes profess a rude Christianity, and belong partly to the Greek and partly to the Armenian Church. In the country of the former there are many fine remains of churches in the Byzantine style. For the first fifty years of the present century the united tribes successfully resisted the aggression of Russia, and were only subdued on the capture, in 1859, of the famous Lesghian prophet-chief Schamyl, who died in April 1871. See the works of Wagner (1850), Petzholdt (1867), Radde (1870), Grove (1875), and Thielmann (1875).

Cau'chy, Augustine Louis, a distinguished French mathematician and physicist, was born at Paris, August 31, 1789. He entered L'Ecole Polytechnique in 1805, where, in 1816, he became Professor of Mechanics. At the revolution of 1830, C.

resigned his position, and soon after accepted the chair of Mathematical Physics in the University of Turin. In 1838 he returned to Paris, succeeded M. Biot as Professor of Physical Astronomy in 1849, and died at Sceaux, 23d May 1857. C. published numerous memoirs in the *Comptes Rendus*, and in Lionville's *Journal de Mathematiques*. His best works are his *Cours d'Analyse* (1821), his *Leçons sur le Calcul Différentiel* (1826), and his *Présumés Analytiques* (1833).

Cau'cus is an immense political machinery which lies outside of the United States constitution, yet brings a powerful influence to bear upon the voters, and practically controls all the elections to office in the country. In every town and village each party meets before the time of election, and makes a full list of nominations to office, or appoints delegates to conventions, and this is called holding a C. Those who attend are generally considered bound to vote the regular ticket, but sometimes a C. is 'bolted,' the dissenting party putting up other candidates. The word is a corruption of *caulkers*,—the early political meetings, about the time of the American Revolution, for the preparation of election business having taken place in a caulker's room in Boston.

Cau'debec, or **Caudebec-en-Caux**, an old town in the department of Seine-Inférieure, France, on the Seine, 26 miles E. of Havre by railway. Its most notable building is a Gothic church of the 15th c., one of the finest in Normandy. It has some river trade and fisheries. Pop. (1872) 1874. C. was formerly capital of the *Pays-de-C.*, the land of the ancient *Caletes*. Subsequently a fortified place, it was taken by the English in 1419, by the Huguenots in 1562, and by the League in 1592. Some 6 miles E. of C. is the famous Benedictine Abbey of St Vandrille or Fontanelle, founded in the 7th c. Here the last of the Merwings died as a monk.—**C.-lès-Elbeuf**, a town in the same department, 12 miles S. of Rouen, has extensive cloth manufactures, and active wool-spinning and dyeing industries. Pop. (1872) 10,715.

Caude'te, the name of two Spanish towns. The first is in the province of Albacete, 51 miles E.S.E. of the city of Albacete, and has a pop. of 5500. The second is in the province of Teruel (Aragon), about 5 miles N.W. of the town of Teruel, and has large bone deposits, fossil and otherwise. Pop. 6000.

Cau'dex (Lat.), the axis of a plant consisting of stem and root. It is, however, generally applied as a synonym of the stipe or woody stem of monocotyledons, especially palms— *Yucca*, *Dracæna*, *Pandanus*, &c.

Cau'dine Forks (*Furculæ Caudinæ*), a pass consisting of two narrow wooded defiles, and taking its name from Caudium, a city of ancient Samnium—'where afterwards, in continuation of the Appian Way, a Roman road was constructed from Capua by way of Beneventum to Apulia' (Mommsen). During the second Samnite war it was the scene of one of the most humiliating reverses ever experienced by the Roman arms. In the year 321 B.C., four legions were trapped by the Samnite general, Caius Pontius, in a 'watery meadow' (Mommsen) between the two passes, and after some days of famine they surrendered at discretion, and were made to pass under the yoke. Livy's account of the details of the disaster may be exaggerated, and he was probably in error as to the precise locality. Niebuhr supposes that previous to their being shut up between the passes the Romans had sustained a defeat, but there is no satisfactory evidence of this.

Cau'laincourt, Armand Augustin Louis de, Duc de Vicenza, was born at Caulaincourt, in the department of the Somme, December 9, 1772. Entering the army at the age of fifteen, he served with distinction in several engagements, acted as aide-de-camp to Napoleon when First Consul, and was made general of division and Duke of Vicenza (1805). He distinguished himself more as a diplomatist than as a soldier, was after the establishment of the Empire sent on various missions, and for four years (1807-11) was ambassador at St Petersburg. He subsequently acted as negotiator at Pleswitz, Prague, Frankfurt, and Chatillon, and is believed to have secured Elba for his master when he abdicated. During the Hundred Days, he was Foreign Minister. He died at Paris, February 19, 1827.—His brother, **August Jean Gabriel**, Comte de C., born 16th September 1777, was a distinguished soldier, and fell at the battle of Moskwa, 7th September 1812.

Cauler'pa, a fine genus of 'green-seeded' (chlorospermous) seaweeds of the W. Indies. They form a large portion of the food of turtles; and it is said that the colour of the 'green fat' of these reptiles—so dear to gastronomes—is due to this kind of food.

Caul'iflower, a variety of the Cabbage (*Brassica oleracea*) (q. v.), in which the young inflorescence is condensed 'into a depressed fleshy esculent head.' It has been cultivated as a garden vegetable since the times of the Greeks and Romans, but was little attended to in Britain until about the 17th C. See BROCCOLI.

Caulk'ing, in ships, is making the seams of a deck watertight by driving oakum into them and then coating them with pitch. The same word is used also for a process by which the joints of boilers, &c., are made steam-tight by the use of a specially formed C.-chisel.

Caulophyll'um, a genus of perennial herbaceous plants belonging to the order *Berberidaceæ*, the rhizome of *C. thalictroides*. The 'Blue Cohosh,' the only species, is a native of N. America, Japan, and Manchuria; it is a stimulating and slightly narcotic tonic, said to be useful in some uterine affections.

Caulop'teris, a genus of large extinct and fossil *Tree-ferns* occurring in the Devonian and Carboniferous formations, and represented by numerous species. The stems were hollow, and bear external markings of leaf-scars, as seen in living tree-ferns.

Cause. 'To have the idea of C. and effect, it suffices to consider any simple idea or substance as beginning to exist by the operation of some other, *without knowing the manner of that operation*.' Locke further carefully distinguishes the cases of creation (in which something previously not existent is produced), generation, and alteration. Modern applied logic has preferred to define C. as the assemblage of conditions, positive and negative, under which a phenomenon is produced; but general usage, both popular and scientific, agrees with Locke in calling, *e.g.*, heat the cause of fluidity in wax; it is the positive condition which, when added, detaches the result. In dealing with both the logical and the psychological doctrine of causation, it must be remembered, however, that the necessity of the connection between the C., however defined, and its effect is purely abstract. Exclude the possibility of disturbing conditions, the effect will be reproduced. The uniformity of nature, which is said to depend on the law of universal causation, does not assume that an effect which has been once produced will ever again be produced anywhere; it assumes that, as regards successions of phenomena which are causally related, A = A; in other words, that the scarcely intelligible conception of 'chance' has nothing to do with the succession of events. The history of the idea of C. shows that in one stage of speculation it was universally believed that the 'reason why' things take place in one way, and not in another, could be obtained. The physical αρχαι of the early Greek philosophy were understood as explaining the universe. Timæus, the Locrian, found in the words Intelligence and Necessity the two real causes of all things. Aristotle believed that the formal C. or essence, the material C. or substance, the motor or efficient C., and the final C. were not mere ideas, but external forces, which made the world of sense intelligible. Indeed, the collection of 'First Causes' by the Abbé Batteux (Par. 1769) fills a considerable volume. In modern Europe the pious Malebranche spoke of God as the one efficient C., assisted by occasional causes; Cudworth and Leclerc invented a plastic nature, and Leibnitz found a sufficient reason for all things in the monads. It was Newton and Locke that first abandoned the search into the 'manner of operation.' Hume reduced the idea of causation to that of invariable sequence, adding that custom was the sole ground for expecting uniformity in the future; and this conception was to some extent worked out by Thomas Brown in an essay which was his first and best work in metaphysics. The Intuitionalist school protested against this analysis, alleging that no amount of experience could warrant the necessity and universality which the mind attaches to the proposition that every event must have a C. In answer to the question, 'How are synthetic *à priori* judgments

possible?' Kant suggested the existence of forms of thought, or categories of the understanding, of which causality was a category of relation. The Scotch Common-sense school classed the belief in causation as fundamental; while in France it was said by Royer-Collard, De Biron, Jouffroy, &c., that the idea of power in volition was transferred by the mind to external phenomena, the successions of which it made intelligible. This was not thought to be inconsistent with a belief in the free, *i.e.*, *un*-caused determinations of the human will, which was thus made the type of invariable sequence. Sir William Hamilton held that the necessity of the causal judgment arose from the inability of the mind to conceive of any change in the 'complement of existence,' a doctrine which he extended even to the case of creation. The Psychological school, on the other hand, contend that the belief in the necessity of causes is a case of inseparable association, formed by the universal and inherited experience of the human race, and intensified by that strong expectation and proneness to believe in the extension of past experience, however slight, which are characteristic of healthy minds before they have undergone scientific training. Although Mr Lewes has lately revived the doctrine of the followers of Leibnitz, that the belief in causation rests upon the axioms of identity and non-contradiction, the majority of this school admit that, in all reasoning from the past to the future, there is a tacit assumption of invariable sequence, for which our only evidence is experience of the past. This is differently put by Mr Spencer, who appeals to the inconceivability of causeless events as the most direct and trustworthy evidence of universal experience. As inconceivability may be produced, however, by very much less than universal experience, and has even been known to resist contradictory evidence, this test cannot be deemed satisfactory, even when confined to the minds of leading scientific men. The view that the consciousness of *will*, whether as control over volitions or control over muscular action, supplies us with an explanation of productive power in external causes is still very popular: many theologians regarding it as essential in the demonstration of an intelligent First C. which constantly sustains nature; a conclusion which they consider to be confirmed by the scientific doctrine of the correlation of forces. Others insist that the doctrine of causation merely affirms a particular C. for every event, and not a general C. for the sum of all effects or events.

Caus'tic substances are those which corrode the skin and other organised tissues. Ordinary or lunar C. is nitrate of silver ($AgNO_3$); C. potash, the hydrate of potassium (KHO).

Caustic, in optics, is the curve or surface of ultimate intersections of rays of light, which have been either reflected from a surface or refracted through a medium, these giving rise respectively to catacaustic and diacaustic curves. The C. produced by the reflection of parallel rays from the inner surface of a circle is a curve of the sixth degree, being the evolute of an epitrochoid. In the case of the paraboloid of revolution, the C. is reduced to a point, *i.e.*, all the rays when reflected pass accurately through one point. The nature of *diacaustics* has not been so fully studied; but the curve produced by refraction at a straight line is the evolute of that ellipse whose foci are the luminous point and its image by reflection. See Malus's *Théorie de la Double Réfraction* and Salmon's *Higher Plain Curves* for detailed information.

Cau'tion, Cau'tionary. In the law of Scotland, where one person becomes security for another, he is said to become C., or to undertake a cautionary obligation for him. According to Stair, C. is 'the promise or contract of one not for himself but for another.' The analogous term in English law is Guaranty (q. v.). A probative writing is required to constitute the obligation. A cautioner who pays a debt has a claim of relief against the principal, and in support of this he can oblige the creditor to assign the debt and any security held by him; and should this support be cut off by any act of the creditor, the C. is freed from his obligation. A cautioner may sue the principal debtor to be relieved of his obligation under certain circumstances before the debt is paid. Mere negligence to take a legal step on the part of a creditor will not usually free a C. from liability. The loss of recourse in case of delay in intimating dishonour of a bill of exchange is an exception to this rule. See BILL OF EXCHANGE.

With regard to cautioners for the due performance of an office, the rules are—That having engaged for the officer's fidelity, they are not entitled to withdraw suddenly, though they may do so after reasonable notice; and that on the death of the cautioner the obligation will subsist against his representatives, who can only withdraw on the same conditions which would have entitled the principal to do so.

Judicial Cautionary is an obligation for appearance or for payment. *Caution judicis sisti* obliges the cautioner to produce him for whom he is bound at all diets of court when required. In case of failure to do so, the bond is forfeited, and the cautioner incurs the penalty without the benefit of discussion. A cautioner *judicis sisti* may at any time free himself from obligation by producing the principal in court, and declaring himself free of further obligation.

Caution Juratory.—When any one is unable to find C., an inventory of his effects may be made up and assigned as security. This is called C. J. See BAIL.

Cau'very, or **Kav'ari**, one of the most useful rivers of India, rises in the Western Ghauts, has a winding course in Mysore and Madras, and enters the Bay of Bengal 130 miles S. of Madras, through many streams (largest, the Colerun), after a course of 472 miles. Its delta is in the district of Tanjore, and extends along the coast for 80 miles. The railways from Beypur and Madras unite at Erode on its right bank, and a line then runs parallel with its stream, in a direction S.E. and E. to the Nagapatam terminus on the coast, a distance of 150 miles.

Ca'va, an intoxicating and narcotic liquor, made from the rhizome of *Macropiper methysticum* (natural order *Piperaceæ*), in the South Sea Islands.

Cava, La, a flourishing town of Italy, province of Salerno, on the Naples and Salerno Railway, 3½ miles N.W. of the latter. Cottons and linens are here manufactured. Pop. 19,480. Near it is the famous Benedictine monastery of the Trinity, with its valuable library of manuscripts (60,000) and parchment rolls (40,000), and a church containing the tombs of various anti-popes.

Cavaign'ac, Louis Eugène, an illustrious French soldier and politician, the son of a member of the National Convention, who afterwards became one of Murat's state councillors in the kingdom of Naples, was born in Paris, 15th October 1802. After a military training in Paris and Metz, he served in the Morea and Algeria, where, in spite of his frankly expressed republican opinions, he rose by his valour and resolute energy to the position of governor-general. Recalled to France by the revolution of 1848, he was elected by two departments to a seat in the National Assembly, and distinguished himself greatly in the crisis. By the skilful manœuvring of his troops as Minister of War, he extinguished the anarchic insurrection of July, and, unlike most conquerors in French conflicts, was merciful to the conquered. He stood as a candidate for the Presidency of the Republic against Louis Napoleon, and obtained a million and a half of votes. On the *coup d'état* of December 1851, C. was imprisoned, but soon released. He steadily declined to recognise the Second Empire, but was allowed to remain in France, where he became a director of the *Siècle* newspaper. He died unexpectedly of heart disease at his country seat in the neighbourhood of Mans, 28th October 1857, and was buried in the presence of a great crowd at Montmartre cemetery. C. was an able soldier, a pointed speaker, and a sincere but moderate republican.—**Godefroi C.**, elder brother of the preceding (born 1801, died 1845), was an able republican politician. He was one of the founders of the famous *Réforme* journal, and also published *Cardinal Dubois, ou Tout Chemin mène à Rome*, and *Une Tuerie de Cosaques, Scene d'Invasion* (Par. 1831).

Cavalier' (Fr. introduced in the 16th c. from the Ital. *cavaliere*, from the Lat. *caballus*, 'a horse'), originally a horse-soldier, then synonymous with knight, and in this sense given to the Royalist party in the times of Charles I. and Charles II. of England, in opposition to the Roundheads or Parliamentarians.

Cavalier, in fortification, a defence-work whose rampart is raised several feet above the ramparts of the fortress in which it is formed. It serves either to defilade them from the fire of an enemy on a neighbouring height, or to send a plunging fire into the trenches of besiegers, and for this purpose it mounts heavy ordnance. The C. is generally constructed on the level ground, or *terre-pleine* of a bastion, and may be bounded either by curved or straight sides.

Cavall'er-Maggio're, an old town in the province of Cuneo, N. Italy, with some trade in agricultural produce. It possesses the remains of two old castles. Pop. 5300.

Cav'alry (Fr. *cavalerie*, introduced in the 16th c. from the Ital. *cavalleria*, Lat. *caballus*, 'a horse'), a military term applied to all horse-soldiers. In the British army the C. is divided into Life-Guards, the Reds, of which there are two regiments; Horse-Guards, or Blues, one regiment; Dragoon Guards, seven regiments; Dragoons, Lancers, and Hussars, of which three designations there are twenty-one regiments. The Life and Horse Guards are styled the Household C., the others are the C. of the line. Cuirassiers (q. v.) is a term applied to Continental C., but does not now describe officially any regiment of the British army. Mounted Rifles is a phrase of comparatively recent importation into the service. On the Continent a distinction is made between *Heavy* and *Light* C., and it is carefully observed regarding both men and horses. The Heavy C. charge the enemy's horse and foot, attack his guns, and cover retreats. The Light C. reconnoitre, carry despatches, maintain outposts, act as scouts and explorers of a hostile country, pursue fugitives, and discharge generally all duties requiring rapidity of movement. In the Franco-German war of 1870, the Uhlans, a regiment of Heavy C., and the Hussars and Dragoons, Light C.—they were all called Uhlans—were employed in the latter kind of service to an extent unprecedented in history. The scout, attended by at least one companion, advanced—sometimes many miles in front of the army to which he belonged—into villages and farmhouses, demanded food and forage, got what news he could, and sent it back, if important, to his commander. The official distinction made among British C., according to the Army Regulations of 1873, is *Heavy*, *Medium*, and *Light*. The Heavy are the Life-Guards, Horse-Guards, 4th and 5th Dragoon Guards, and 1st and 2d Dragoons; the Medium are the 1st, 2d, 3d, 6th and 7th Dragoon Guards, the 6th Dragoons, the 5th, 9th, 12th, 16th, and 17th Lancers; the Light are all the Hussars, and comprise the 3d, 4th, 7th, 8th, 10th, 11th, 13th, 14th, 15th, 18th, 19th, 20th and 21st regiments. A regiment of the C. of the line has generally eight troops, each made up of 55 rank and file, and has, as officers, a colonel, a lieutenant-colonel, a major, 8 captains, 18 subalterns and other commissioned officers, and 59 non-commissioned officers—88 in all. The cost to the country of a full regiment of C. is about £25,000 a year for horses, accoutrements, clothing, and pay. A lieutenant-colonel in the Guards ranks with a colonel of the line, and a major in the former with a lieutenant-colonel of the latter. Canterbury is the C. depôt for this country. According to the army estimates laid before the House of Commons in the session 1874, there were in the Life and Horse Guards 81 officers, 192 non-commissioned officers, trumpeters, and drummers, and 1029 rank and file—total, 1302. In the C. of the line there were 550 officers, 1166 non-commissioned officers, trumpeters, and drummers, and 9906 rank and file—total, 11,622. The entire C. service, therefore, numbered 12,924. In 1873 the total number was 13,051; the highest number since 1815, when it was 14,913. See Col. Denison's *History of C. from the Earliest Times* (Lond. 1877).

Cavalry Tactics is the manner in which cavalry are used in actual warfare. The several duties of heavy and light cavalry have been referred to in the previous article. The threefold division of that arm of the service which obtains in this country renders their separate duties less easily definable, and is said to impair the C. T. When an attack is going to be made by cavalry, they are, when the numbers are sufficient to admit of the arrangement, grouped into an attacking, a supporting, and a reserve body. Thus at the famous charge of the Light Brigade at Balaklava, the attack was made by the 13th Light Dragoons, the 17th Lancers, the 4th Light Dragoons, and the 11th Hussars; the support consisted of the 8th Royal Irish Hussars; and the reserve consisted of the Heavy Cavalry Brigade, which covered the retreat of the survivors. The attack on cavalry is made in line; on infantry, in column; and on artillery, *en échelon* (q. v.). Cavalry cannot fight at a distance; and when two bodies of this force come close, they rarely continue the struggle—one of them usually turning to gallop off, and the other pursuing it for a time. Cavalry seldom win a victory; they prepare for it, and secure its best results, but the work of actually winning is usually done by infantry and artillery. The gallop in which a charge is made is at the rate of 11 miles an hour; the trot in manœuvring, 8 miles; and the walk on general service, 4 miles an hour. There is no fixed proportion generally observed between cavalry and infantry in the armies of Europe. In the British service the proportion is about 1 to 8; in Russia, 1 to 6; in France and Austria, 1 to 5; in Prussia and Bavaria, 1 to 4.

Cav'an (Irish Gael. *cabhan*, 'a hollow'), the capital of a county of the same name, Ireland, and a station on the N. W. Railway, 75 miles N.W. of Dublin, lies in a hollow on the C., a small tributary of the Annalee. It has a court of justice, a county infirmary, barracks, a fine public garden, and some local trade, chiefly in agricultural produce. Pop. (1871) 3532.

Cavan, a county of Ireland, in the S.W. of the province of Ulster, has an area of 746 sq. miles, and a pop. (1871) of 140,735; of whom 113,174 were Roman Catholics, and 21,223 Episcopalians. It is mountainous in the N.W., and is watered by the Erne, Croghan, Annalee, &c. It has also several lakes, of which the chief are Loughs Oughter, Sheelan, and Ramor. In 1871 one-third of the surface was under tillage, producing oats, flax, turnips, and potatoes; nearly a half in pasture; a ninth in bog, mountain, &c.; and there were some 5700 acres in plantation. C. is the most productive mineral county of Ulster, yielding coal, iron, copper, lead, and limestone. Its only considerable industry is the linen manufacture.

Cavarze're, a town of Italy, province of Venice, on the river Adige, 25 miles S.S.W. of the city of Venice. The river divides it into *C. destro* and *C. sinistro*—the S. and N. sides of the city. C. has an active trade in cattle, silk, and firewood. Pop. 11,200.

Cavati'na, a name sometimes given to the simpler and more song-like operatic arias.

Cave, Edward, was born at Newton, Warwickshire, 29th February 1691, educated at Rugby, went to London, where he became a printer, and afterwards held a place in the post-office. In 1731 he founded the *Gentleman's Magazine*, the forerunner of the many literary journals amid which it still exists. He died 10th January 1754.

Cave, William, an English divine, was born at Pickwell, Leicestershire, 30th December 1637. He studied at Cambridge, was appointed to the vicarage of Islington, Middlesex, in 1662, afterwards became chaplain to Charles II.; in 1679 was collated to the rectory of All Hallows the Great, and in 1684 was installed canon of Windsor. He died 4th August 1713. His chief works are *Primitive Christianity* (Lond. 1674); *Antiquitates Apostolicæ* (1676), a continuation of Jeremy Taylor's *Antiquitates Christianæ; Apostolici* (1677); and *Scriptorum Ecclesiasticorum Historia Literaria* (1688–98). The last of these—his most important work—was republished at Oxford, 1740–43.

Cav'eat is a law term signifying an intimation made to the proper officer to prevent any step being taken without warning to the person lodging the C., so that he may appear and object to it. In England, the term is specially applied to a process entered in the spiritual courts to restrain the institution of a clerk to a benefice, or to restrain probate of a will.

Cav'endish, Henry, the famous chemist and natural philosopher, was born at Nice, October 10, 1731. He was a son of Lord Charles Cavendish, and brother of the great-grandfather of the present Duke of Devonshire. He studied for four years at Cambridge, and then retired into great privacy, much to the dissatisfaction of all his relatives, except an uncle, who made C. heir to his large fortune. His tastes were always simple, his manners eccentric and very reserved; so much so, that he fixed his fine library at a distance from his house, so as not to be disturbed by visitors. The number of his papers in the *Philosophical Transactions* can give no idea of the immense services which he rendered to physical science. His investigations on carbonic acid gas, on hydrogen, nitrogen, and oxygen, and several of their compounds, form one of the greatest epochs in the progress of chemistry. His analytic and synthetic proofs of the composition of water would alone entitle him to a first place; while the perfection of his processes, the accuracy of his reasoning, and the soundness of his views, taken in connection with his important discoveries, show him to have been a true philosopher, worthy the name of the 'Newton of chemistry.' C. also wrote several papers on electricity, on astronomical instruments, and is further noted for his determination of the mean density of the

Earth (q. v.). He died February 24, 1810, leaving behind him a fortune of more than a million sterling. See Dalton's *Life of C.*, published by the Cavendish Society (Lond. 1854).

Cavendish, Thomas, one of the great navigators of the Elizabethan age, was born in Suffolk in 1560, and studied at the University of Cambridge. He first accompanied the expedition to Virginia, and soon after his return fitted out three ships in July 1586, to levy contributions on the Spaniards on the W. coast of America. After touching the coast of Patagonia, he rounded Cape Horn, sailed N. to California, where he captured a Spanish galleon loaded with treasure, and returned by the Cape of Good Hope to England, where he landed, 9th September 1588. His voyage is chiefly remarkable as being the shortest round the world that had up to that time been made. A second voyage was not so successful; his crew mutinied, and C. died of vexation in 1592, on the coast of Brazil. From him 'Cavendish' tobacco takes its name.

Cavendish, William, Duke of Newcastle, an enthusiastic Royalist, was the son of Sir Charles Cavendish, younger brother of the first Earl of Devonshire, and born 1592. Originally a favourite of James I., he was made Earl of Newcastle by Charles I., who intrusted him with the education of his son, afterwards Charles II. On the civil war breaking out, C. supported the royal cause in the N. with much spirit, and for a time with some success. After the battle of Marston Moor he retired to the Continent till the Restoration, when he was made a duke. He died December 25, 1676. C. wrote a book on the management of horses, and some plays and poems entirely void of merit. C.'s Life was written by his wife.—**Margaret C.**, Duchess of Newcastle, second wife of the above, and a daughter of Sir Charles Lucas, was born about 1592, married in 1645, and died in 1673. She is remarkable for writing nineteen plays and ten folio volumes in prose and verse, which, though praised at the time of publication, are now generally admitted to be utterly worthless. Among them are *The World's Olio*, *Nature's Picture*, *Orations of Divers Sorts*, *Philosophical Letters*, *Poems and Phancies*, and *Sociable Letters*.

Caves or **Cav'erns**, the name applied to hollow excavations in the earth or in the rocks of the earth's crust, and which have been formed either by art or nature. The physical agencies of most repute in forming C. are water generally and the sea. By the slow percolation and dripping of water on rocks of soft or dissolvable nature (*e.g.*, limestone), aided by *chemical action*, C. are hollowed out; and similarly by the eroding action of the sea-waves caverns on the sea-coasts are formed. In some cases, the rush of inland water towards the sea, and the force of the sea-waves from without, may together combine to form caverns. Inland C. sometimes afford valuable evidence to the geologist of the former sites and scenes of sea-action. The well-known Mammoth C. of Kentucky, which penetrate internally for miles in numerous branches, are examples of C. which have been formed by the solvent action of underground water on limestone rocks. These latter rocks, indeed, are those which most frequently are so eroded to form caverns. The oolitic limestone is in this way perforated in various parts of the world. In the nearly allied triassic rocks, many of which contain easily dissolvable materials, C. are also found; and the formations or lime-pillars known as *Stalactites* (q.v.) and *Stalagmites* (q.v.) found in limestone caverns are formed by the dripping of water containing calcareous salts, which, in the course of years, are deposited to form solid pillar-like structures. In igneous rocks (*e.g.*, Fingal's Cave, Staffa), C. are occasionally met with; and in lava formations (as in Iceland, &c.), they may also be formed. The interiors may be incrusted with calcareous matter, which is frequently coloured, or may be pure white, and may light up the C. with a brilliant lustre. C. afford valuable evidence to the palæontologist, from the fact that deposits of organic remains are frequently found in them. This fact depends, firstly, on their having been used as habitations by the animals (*e.g.*, Kirkdale Cave in Yorkshire); or secondly, animals may have accidentally fallen into and died in the C.; or thirdly, and more commonly, the rivers and streams flowing into the cavern, have swept into it, along with debris, the remains of animals, which, in either of these three cases, have become entombed amid the stalagmitic calcareous crust forming the floor of the cave. Thus, in the *Cave-deposits* of England, the remains of man, of hyænas, of bears, of the mammoth, rhinoceros, bison, hippopotamus, and many other genera of mammals now extinct or foreign to Britain, have been discovered.

Cav'iare (in the 16th c. *cavial*, from the Ital. *caviale*; perhaps from the Turk. *haviâr*; the Russian name is *ikra*), the roe of the sturgeon preserved by salting, and very highly esteemed in Russia as a food delicacy. A considerable trade exists in the article, the chief seat of which is at Astrakhan, on the Volga, and it brings a high price in Russian markets.

Cavicor'nia ('hollow horned'), the family or group of *Ruminant* mammalia, including the oxen (*Bovidæ*), sheep and goats (*Ovidæ*), and antelopes (*Antilopidæ*). The upper jaw in all is destitute of incisors and canine teeth, and the lower incisors bite against the hardened gum in the front of the upper jaw. The lower jaw has six incisors, two canines, and twelve molars; the latter separated by a wide interval from the canine teeth. Both sexes (as generally in sheep and goats), or the males only (as in some genera of antelopes), may possess horns. These horns, it is to be noted, are hollow structures, consisting each of a hollow sheath of horn surrounding a central bony core. They are not deciduous or shed, as in the *Cervidæ* or Deer (q. v.), but permanent. The feet are cleft, and provided with two accessory hoofs at the back.

Cavite, the capital of a province of the same name, in the island of Luzon, Philippines, on the Bay of Manilla, 10 miles S.S.W. of Manilla. It is the chief naval station of the Philippines, and has manufactures of cigars. Pop 7000. The *province* of C., which yields rice, indigo, sugar, and coffee, has a pop. of 57,000.

Cavor', or **Cavour'**, a town of N. Italy, province of Cuneo, on a feeder of the Po, in a marble and slate quarrying district, 24 miles S.S.W. of Turin. Pop. 7000, engaged in the manufacture of linen, silk twist, &c.

Ca'vo-Rilie'vo, an Italian compound, meaning 'hollow-relief,' and applied to a species of carving in which the highest surface of the object represented is on a level with the plane of the block, the rounded sides being cut into it. The stone carvers of ancient Egypt employed this style of art.

Cavour', Count Camillo Benso di, the greatest Italian statesman of modern times, was born of a noble Piedmontese family at Turin, August 1, 1810. He was educated originally for the army, but his liberal opinions in politics compelling him to withdraw from the public service, he devoted himself to agriculture. He paid a visit to England (1835), and the fruits of this visit were seen when he returned to public life in 1842, and both in the press and in the Chamber of Deputies, opposed extreme Democratic opinions, while he advocated the adoption of a Liberal constitution for Sardinia. During a second visit to England in 1843, he carefully studied its agricultural, industrial, and politico-social condition. After the disastrous battle of Novara, C. was called to office, and filled in succession the offices of Minister of Agriculture and Commerce, Minister of Marine, and Minister of Finance. Finally he succeeded, in 1852, the Marquis d'Azeglio as Premier. From that period to his death, 6th June 1861, the history of Sardinia may be said to have been that of C. It was he who introduced free trade, and completed the remodelling of the Sardinian constitution upon that of England; who made his country of account in Europe by making it the ally of England and France in the Crimean war, and who conducted the war with Austria in 1859. With the exception perhaps of Garibaldi, none was so responsible as he for the events which led to King Victor Emanuel being made King of Italy. Although he did not live to see Venetia and Rome ceded to Italy, he must be considered the author of Italian unity. He has often been compared to Bismarck (q. v.), but the resemblance is superficial. Both, it is true, laboured with indefatigable energy and singular skill to secure the unity of their respective countries, but C. was always a moderate and constitutional Liberal, while the German statesman, though surcharged (latterly) with patriotic sentiment, has never even pretended to respect parliamentary institutions. Among the best works to consult for a proper idea of the great statesman are *Œuvres Parlementaires du Comte de C.*, by his secretary, M. Artom; *Lettres inédites du Comte de C.*, à M. M. Ratazzi (1862); and above all, *Le Comte de C., Recits et Souvenirs*, by De la Rive (Par. 1863).

Ca'vy, a name popularly applied to animals such as the Guinea-pig (*Cavia aperea*), Patagonian C. (*Dolichotis Patachonicus*), &c., included in the Rodent family *Cavidæ*, which is distinguished by the hairy nature of the body-covering and by the rudimentary tail. No clavicles are developed. The ears are short and the nails are hoof-like. The molars number four on each side of each jaw, and exhibit complicated foldings of their enamel. The common Guinea-pig is a true rodent, and comes from S. America, not from Africa, as its name would lead some to suppose. It is readily tamed, and very prolific. The colour varies, but usually consists of white, red, and black patches, differently disposed in different individuals. The Capybara (q. v.) is also included in this group, and the Agoutis (q. v.) form another genus (*Dasyprocta*) of the family.

Cawk, the term applied by miners to a massive, earthy-looking variety of the mineral sulphate of baryta, or heavy spar, which is very common in Derbyshire. See BARIUM.

Cawnpore', or **Khanpur**, the chief town in a district of the same name, N.W. Province, British India, on the right bank of the Ganges, at the junction of the Rohilkund and Oude Railway and the E. Indian line, 55 miles S.W. of Lucknow. It is of comparatively recent origin, but has many fine mosques and other public buildings, while its streets are rendered shady and picturesque by an abundance of trees. The cantonments here, which before the mutiny covered 6 miles of ground, are still among the largest in India. C. has considerable trade in rice, indigo, opium, oil-seeds, tobacco, &c. It is almost as cheap a place of residence as Calcutta. Pop. (1871) 113,601. C. formerly belonged to the Nawab of Oude, but became British in 1777. Here Nana Sahib brought about the massacre of 205 British women and children, June 15, 1857. The *district* of C., a rich alluvial flat stretching between the Ganges and Jumna, has an area of 2353 sq. miles, and a pop. (1871) of 1,155,439.

Caxamar'ca, a town of Peru, in a rich silver and iron mining district, at an elevation of some 9000 ft., 74 miles N.N.W. of Truxillo. Pop. 18,330, engaged chiefly in artificing silver and iron articles, and in manufacturing cotton and woollen cloths. In its neighbourhood are the hot *Baths of the Incas*. C. is celebrated in history as the scene of the treacherous capture of Atahualpa (q. v.) by the Spaniards. It gives the name to a department. Pop. (1862) 173,000.

Caxamarquill'a, a Peruvian town on the eastern slope of the Andes, in the department of Caxamarca, 65 miles E.S.E. of the town of Caxamarca.

Cax'ton, William, introducer of printing into England, was born about 1421, and became a mercer at London, and freeman of the Mercers' Company. In 1441 he journeyed to the Low Countries, and in 1464 was employed as 'ambassador and special deputy' by Edward IV. to frame a commercial treaty with the Duke of Burgundy. C. learned the art of printing in the Low Countries, and after a residence at the household of Margaret of Burgundy, brought it into England, probably in 1476. His press was set up in the almonry at Westminster, the first work from it being the *Game and Playe of the Chesse*; the second, *Dictes and Notable Wyse Sayenges of the Phylosophers*. These are printed in black letter. C. was busied in printing to the last day of his life, and sixty-four books were issued in twenty years. He died in 1491 or 1492. See Lewis's *Life of C.* (8vo, Lond. 1737); Knight's *William C., a Biography* (Lond. 1844); Ames's *Typographical Antiquities* (1810); and Blade's *Life and Typography of C.* (2 vols. Lond. 1861-63; new ed. revised, 1877.).

Cayenne', the capital of French Guiana, S. America, lies on an islet near the coast, and at the mouth of a small river, both of the same name. It is partly well built, and has a beautiful church and several other fine buildings. Its harbour is deep and commodious, and it has now all the commerce of the colony. The exports are cotton, coffee, cloves, maize, gums, &c. Pop. 5200. The climate of C. is hot and unhealthy.

Cayenne Pepper is the seeds of Capsicum (q. v.) reduced to powder.

Cay'man, or **Caiman**, a term popularly applied to *Alligators* (q. v.), but also given generally to the *Crocodilia* of S. America, which include species of true crocodiles, as well as of the first-mentioned. The *Alligator palpebrosus* of Surinam and Guiana sometimes receives the distinctive title of 'C.' This animal is remarkable for a circle of bony plates surrounding each eye like an eyebrow.

Cazall'a de la Sierr'a, a town of Spain, province of Seville, 36 miles N.E. of the city of Seville. The principal industry is the smelting of metals, the casting of cannon, and the manufacturing of machinery and agricultural implements. Tanning, weaving, and distilling are carried on, and marble is quarried in the neighbourhood. Pop. upwards of 6500.

Cazor'la, a city of Spain, province of Jaen (Andalusia), on the river Vega, 41 miles N.E. of Jaen; has a trade in fruits, grain, and cattle, and manufactures of leather, soap, bricks, wine, and oil. C. figured in the contests with the Moors in the 13th c. Pop. between 7000 and 8000.

Ceano'thus. See REDROOT.

Ceara', or **Ciara'**, a province on the N. coast of Brazil. Area, 50,260 sq. miles; pop. 550,000. It stretches up from the Atlantic in the form of an amphitheatre. The principal products are medicinal plants, balsams, gums, and resins; the minerals include gold, silver, iron, copper, lead, salt, saltpetre, alum-stone, and rock-crystal. The forests furnish exhaustless supplies of timber, and abound in game. The capital, also called C., is the oldest town in the province, lies on a bay between the promontory of Mararanguape in the N. and the tongue of land Mocoripe, and is sometimes named Port Mocoripe. It exports coffee, sugar, cotton, and has a pop. of 12,000.

Cebadill'a, or **Cevadill'a**. See SABADILLA.

Ce'bus, a typical genus of *Platyrhine* (q. v.) or S. American monkeys, forming the type of the family *Cebidæ*. In this group there are four incisors, two canines, six præmolars, and six molars in each jaw. No cheek-pouches or callosities exist, and the jaw may either be naked or possess whisker-like appendages. The tail is long, and for the most part prehensile. The thumbs, if present, are not opposable to the other fingers, which are all provided with flattened nails. Numerous species are included in this family, and in the typical genus *Cebus*. The Capuchins (q. v.), *C. apella*, and *C. capuchinus* or Sai, the horned sapajou (*C. fatuellus*), &c., are familiar genera. The genera *Callithrix*, *Mycetes*, *Ateles*, or popularly the Squirrel Monkeys (q. v.), Howlers (q. v.), and Spider Monkeys (q. v.), also belong to it.

Cecido'myia, a genus of *Diptera* or Flies, included in the family *Tipulidæ*, and exemplified by the *C. tritici* or 'Wheat-fly' (q. v.), and by the dreaded Hessian-fly (*C. destructor*) of the United States, which attack the wheat and corn crops respectively. The larvæ of the former attack the flower of the wheat and destroy the plant; the larvæ of the latter destroy the stem and root. *C. cerealis* destroys the barley crops, and is hence known as the 'barley midge.' This fly is of a reddish colour, has wings of greyish or silvery hue, long legs and antennæ, and downy wings, which lie horizontally when at rest.

Cec'il, William, Lord Burleigh or Burghley, described by a biographer as the boldest, the greatest, and the gravest statesman in Christendom, was born September 13, 1520, at Bourne, Lincolnshire, educated at St John's College, Cambridge (1535-40), and studied law at Gray's Inn, showing in the course of his studies great aptitude for learning, especially in law and theology. In the last year of Henry VIII.'s reign he held the place of *custos brevium* in the Court of Common Pleas; while in the reign of Edward VI. he secured, through his marriage with a daughter of Sir Anthony Cook, the patronage of the Protector Somerset, became privy councillor and state secretary (1550), and in the following year was knighted. In the last office he showed himself to be much in advance of his time by abolishing several stated monopolies, and endeavouring to make trade free. On the accession of Mary he resigned office, but escaped persecution. Under Elizabeth he obtained the highest honours of the state, and was till his death her trusted adviser, whom no favourite could overthrow. In 1571 he was created Baron Burleigh, and in 1572 was made Lord Treasurer, which office he held till he died, lamented by the mistress whom he had served with perfect fidelity, August 15, 1598. C. was admirably adapted for the post he filled, being a man of no strong passions or vices, devoid of anything like fanaticism, and although

of robust sense, disposed to serve rather than to thwart Elizabeth. Macaulay has said of him with truth, that he was 'a moderate, cautious, flexible minister, skilled in the details of business, competent to advise, but not aspiring to command,' and that he 'belonged to the class of the Walpoles, the Pelhams, and the Liverpools, not to that of the St Johns, the Carterets, the Chathams, and the Cannings.' See Nares' *Memoirs of the Life and Administration of William C., Lord B.* (3 vols. Lond. 1828–32).—**Robert Cecil**, Earl of Salisbury, son of the preceding, was born about 1550. He was educated at St John's College, Cambridge, sat in Parliament for Westminster and the county of Hereford, and succeeded his father in the favour of Elizabeth. On her death he was continued in the offices he held by James I., with whom he had, before his mistress's death, been in secret correspondence; was made Earl of Salisbury in 1605, and on the death of Dorset, Lord Treasurer. C. was a sagacious and energetic statesman, free from meanness and petty dishonesty, although his conduct towards Essex and Raleigh shows him in an unfavourable light as cold and unscrupulous. He died May 24, 1612.

Cecil'ia, St, the patroness of music, according to the legend of her life, belonged to a distinguished Roman family, and suffered martyrdom in the reign of Alexander Severus, about A.D. 230. Shortly after her conversion to Christianity, her heathen parents compelled her to marry an unconverted Roman youth named Valerian, but she soon induced him, his brother Tiburtius, and an imperial officer named Maximus, to embrace the Christian faith. They were all arrested and condemned to death, the male converts suffering first, and C. three days afterwards. A church dedicated to her was built at Rome, in the Trastevere, or right bank of the Tiber. It is mentioned as early as the 5th c., and in it the bones of the saint were deposited in 821 A.D. by the orders of Pope Paschal. Musicians have assumed St C. as their patron, because she sang the praises of the Lord, and frequently joined instrumental with vocal music in public worship. Her festival, November 22, is celebrated in the Roman Catholic Church with grand musical performances. Carlo Dolce, Raphael, Rubens, Domenichino, and other artists have lent their genius to immortalise this saint, and her praises have been sung in English by Chaucer, Dryden, and Pope. There was another St C., of African origin, who suffered about the year 304 A.D. during the persecution of Diocletian, and whose festival falls on the 11th of February.

Cecro'pia, a genus of trees of the natural order *Artocarpaceæ*, natives of tropical America. About twenty-five species have been described, all large-leaved, soft-wooded, milky-juiced trees. *C. peltata*, the trumpet-tree of the W. Indies and S. America, so called because musical instruments are made out of its hollow branches by the Uaupé Indians of the Rio Uaupés, a tributary of the Rio Negro. Cordage is made out of the inner bark, and the old bark is used medicinally. The young buds serve as a potherb; the old leaves are eaten by the sloth, and a kind of caoutchouc is formed from the hardened milky juice. Of the light wood are made floats for fishing-nets, and razor strops. The Indians also use it, when dry, to produce fire by friction. (*Treas. of Bot.*)

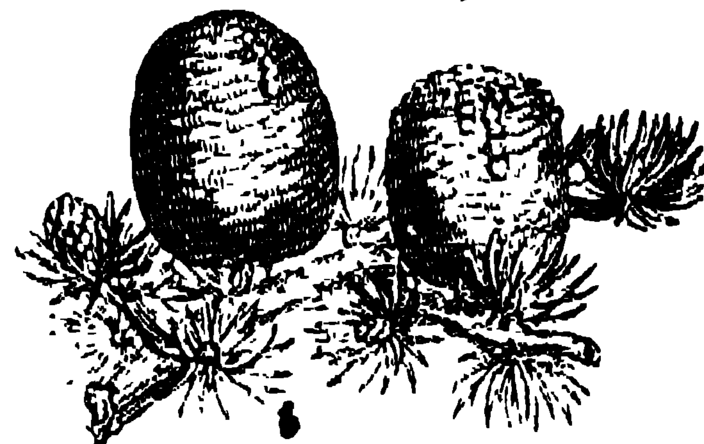
Ce'crops, the mythical hero of the Pelasgian race, and the first King of Attica, which from him was sometimes named Cecropia. The oldest myths make him autochthonous, and represent him as having introduced the elements of civilised life by the institution of marriage, the substitution of cakes instead of bloody sacrifices in the worship of Zeus, and the political division of Attica into twelve communities.

Ce'dar Bird. See WAX-WING.

Cedar Mountains, an extensive range in Clanwilliam, Cape Colony, from 1600 to 5700 feet high, runs between the Great Roggeveld and the coast, and takes name from the cedar-trees on its summit.—A mountain of the same name in America, near Cedar Run, in Virginia, was the scene of a Confederate victory gained by General 'Stonewall' Jackson over General Banks, August 9, 1862.

Cedar of Barbadoes (*Cedrela odorata*), one of the natural order *Cedrelaceæ* (q. v.), a native of the W. Indies and the warm regions of America. The wood is fragrant, and used for making canoes, shingles, cigar-boxes, black-lead pencils, &c. *Juniperus Barbadensis* is also called the *Barbadoes cedar*, while *C. odorata* is termed the *Bastard B. C.*, or *sweet-scented C.* The name *Bastard C.* is also given to *Guazuma almifolia.*

Cedar of Lebanon, a famous tree frequently referred to in the Scriptures, belonging to the order *Coniferæ*. It is the *Cedrus Libani* of modern botanists, and is by some considered identical with the deodar of India and the Mount Atlas cedar. Frequently it is put into the genus *Abies*. The cedars of L. consist of a grove containing about 400 trees, most of which may be from 200 to 800 years old. The height of some much exceeds the average of 50 feet, but their girth is more remarkable. Two of the trees held in great veneration by the Maronites, Greeks, and Armenians, are believed to be about 2000 years old.


Cedar

The C. of L. has been long ago introduced into our parks and grounds. One at Sion House, near London, is 8 feet in diameter 3 feet above the ground.

The deodar of the Himalayas (*Cedrus Deodara*) is found at great elevations, and attains a height of 150 feet. The cedar of Algeria (*C. Atlantica*) is closely allied if not identical. The name *cedar* is given to a variety of trees which have no connection with the genus—*e.g.*, the cedar of N. W. America (see THUJA and LIBOCEDRUS); the Siberian cedar (see PINE); *Abies religiosa* of California (see FIR); the white cedar (see CYPRESS); the Virginian cedar (see JUNIPER), &c.; while the cedar-wood of Guiana is *Icica altissima* (natural order *Amyridaceæ*), and the cedar of the W. Indies (see CEDAR OF BARBADOES) belongs to the *Cedrelaceæ*, and the bastard cedar of India is one of the *Byttneriaceæ* (q. v.). The Honduras cedar is the *Cedrela odorata*; the Japan cedar, *Cryptomeria Japonica*; the cedar of N. S. Wales, *Cedrela australis*, the prickly cedar, *Cyathodes Oxycedrus*; the white cedar of Australia, *Melia australis*; and the white cedar of Dominica, *Bignonia Leucoxylon*.

Ce'drat. See CITRON.

Cedre'la, a genus of trees of the natural order *Cedrelaceæ*, natives of the tropical parts of Asia and America, producing fine timber. *C. odorata* is hollowed into canoes. *C. Toona* of India furnishes a timber like mahogany, but lighter. The bark is astringent, and used in fevers, dysentery, &c.; from the flowers a red dye is produced. *C. australis*, the red cedar of Australia (see CEDAR), is used for building houses, and is now getting scarce.

Cedrela'ceæ, a natural order of plants belonging to the division *Dicotyledons* (sub-div. *Thalamifloræ*), natives of tropical America, India, and Africa, though rare in the last of these countries. Most of them are fragrant, aromatic, and tonic. Mahogany (*Swietenia Mahagoni*, q. v.), Satin-wood (*Chloroxylon Swietenia*, q. v.), yellow-wood of N. S. Wales (*Oxleya xanthoxyla*), &c., belong to the order—in which, in all, there are nine genera and twenty-five species known. The barks of several are used as febrifuges in diarrhœa, &c.

Cef'alu ('on the headland;' anc. *Cephalædium*), a seaport of Sicily, province of Palermo, 37 miles E.S.E. of the city of Palermo, on a headland stretching far into the sea. It has a cathedral, and the ruins of a castle built by the Saracens. Sea-fishing is actively prosecuted, but the harbour can accommodate only a few vessels. Pop. 10,790.

Cegl'ie, a town of Southern Italy, province of Terra d' Otranto, 22 miles W. of Brindisi, and 4 miles from the railway to that port. The staple trade is in grain and cattle. Pop. about 10,000.

Cehegin', a town of Spain, province of Murcia, 36 miles W.N.W. of the city of Murcia. It has manufactures of paper and cloth. Pop. about 10,000.

Ceil'ing (Fr. *ciel*, Lat. *cœlum*, 'the vault of the heavens,' 'the sky') is a name now restricted to the inner covering portion of any room, apartment, or hall. The ceilings of rooms in private

houses are usually horizontal surfaces of plasterwork, relieved only by a surrounding cornice of moulded or cast plasterwork. In apartments of large dimensions, and in public halls, the ceilings may be either horizontal, 'coved,' that is, rising from the walls with a curve, or vaulted. When a coved roof is used, the height of the cove varies from one fifth to one-third of the whole height, according to the proportions of the apartment. All such ceilings, of whatever form, should be divided into panels, the main divisions of which represent the principal timbers of the roof. Such panelling affords a basis for a great variety of rich and effective ornamentation, either with decorative guilloches or frets, or by the application of colour, &c. In domed or vaulted ceilings, the panels of course decrease in size as they approach the centre of the vault. Ceilings of wood, framed and panelled, and often richly moulded, carved, and otherwise decorated, are also frequently found. Timber-groined ceilings exist in the choir and Lady Chapel at St Albans, in the cloisters at Lincoln and Gloucester, in the towers at Exeter, in the lantern at Peterborough and at Ely, and in the choir at Winchester, while the entire roof of York Minster is so finished. A fine example of an enriched timber roof exists in the Parliament House, Edinburgh.

Cel'andine (*Chelidonium*), a genus of plants of the Poppy order (*Papaveraceæ*). *C. majus* is a common wayside plant in many parts of Britain and the continent of Europe. Its yellow milky juice has been applied as a cure for warts, and mixed with milk for the cure of opacities of the cornea of the eye. It is also a drastic purgative, and poisonous in large doses. Its other uses are doubtful.' The 'lesser C.' is *Ficaria ranunculoides*, while the 'tree C.' is *Bocconia frutescens*.

Cela'no Lagodi. See FUCINO LAGODI.

Celas'trus and **Celastra'ceæ**. See SPINDLE-TREE.

Cel'ebes, an island of Malaysia in the Indian Archipelago, E. of Borneo, from which it is separated by the Strait of Macassar. It is of very irregular form, branching into four peninsulas, two to the E. and two to the S., separated by three deep gulfs. In the centre and N. are high mountains, some nearly 7500 feet in height, and several active volcanoes. The principal rock is a crumbling basalt, in many places covered with a layer of earth from 10 to 20 feet thick, of extraordinary fertility, producing heavy crops of rice, maize, coffee, and cacao. The sago and cocoa-palm abound, as well as ebony and other useful timber trees. There are rich pastures, supporting numerous herds of buffaloes, horses, goats, sheep, and game is abundant. The minerals are gold, copper, iron, tin, and coal in the S. The sea produces fish, turtles, and pearls. The climate is hot, but tempered by regular sea-breezes and winds from the N. C. exports cotton, edible birds'-nests, wax, tortoise-shell, pearls, sago, cassava, coffee, cacao, Muscat nuts, &c. The Portuguese first visited C. in the 16th c., but were expelled by the Dutch in 1663, who have held it ever since, except between 1811 and 1816, when it was in the hands of the British. The Dutch possessions now occupy an area of 45,700 sq. miles, with a pop. (1872) of 349,756. The entire pop. has been estimated at from two to three millions, but is probably much less. The Malays carry on the commerce of the coast; the natives of the interior (Alfures) form numerous independent states. C. is properly the name only of the E. part of the island; the S.W. part is called Macassar, which has a capital of the same name, the residence of the Dutch governor. See MACASSAR.

Cel'ery (*Apium*), a genus of plants of the natural order *Umbelliferæ*. The wild C., or smallage (*A. graveolens*), is a plant chiefly found near the sea-shore, and in other saline situations, in ditches, brooks, &c. It has been long cultivated for the sake of its root and the thick leaf-stalks, which, when blanched by being covered with earth, are eaten. They act as a stimulant of the urinary organs. *A. australe* grows in the Cape of Good Hope, and is almost as good as our cultivated plant.

Cel'estine (Lat. *cœlum*, 'the sky'), the native sulphate of strontia, occurring crystallised according to the trimetric system, but more usually massive, columnar, fibrous, or stellated. It is colourless, white, or grey, often tinged with blue, more or less deep—hence the name. It is found in considerable quantity near Bristol, where it is employed for making nitrate of strontia, which is used for producing the 'red-fire' of pyrotechnic displays.

Celestines, a monastic order founded about 1264 by Pietro da Morrone, who became Pope in 1294 as Celestine V., after which the members took the name of C. They adopted the rule of St Benedict, and devoted themselves to religious meditation. Pope Gregory granted the order many privileges, and it became very rich, especially in France and Italy. But the secularisation of its property in the former country in 1776-78 by order of Pope Pius VI., and in Naples a few years later by King Ferdinand IV., has led to the almost complete extinction of the order.

Cel'ibacy (from the Lat. *cælebs*, 'unmarried'). The origin of the practice of continence on the part of the priesthood lies in the dualistic notion of the essential impurity of matter, and the supposed necessity thence arising for crucifying the flesh for the sake of greater purity and spirituality of mind, combined with the desire to separate the sacerdotal order from the rest of society, and to raise the clergy to a seemingly higher level than ordinary men. Among the ancient Egyptians the priesthood were obliged to preserve the most rigid chastity; the priestesses of Vesta, Juno, Diana, Minerva, &c., were pledged to perpetual virginity; and the priests of Cybele had to be eunuchs. On this principle, that woman is sensuality, that generation, conception, and birth are a defilement of the soul, many of the early heretical sects forbade marriage both to their priests and adherents, or at least denounced a second or third marriage as fornication.

In the Catholic Church, during the first three centuries, the marriage of the clergy was permitted. Still those were regarded as more holy and excellent who lived in C., because those who were married were more exposed to the assaults of evil spirits. In order to conform to this idea, many of the clergy at this time kept as concubines females who had vowed perpetual chastity, with whom, they asserted, they had no sexual intercourse. At the Council of Elliberis (Elvira) in Spain (305), continence was enjoined on the clergy of the first three grades after their ordination. At the Council of Neocæsarea (314) it was enacted—'If a presbyter marry, let him be removed from his order.'

Hitherto the usage had been that those married previously to ordination were not required to separate from their wives; an attempt made at the Council of Nice (325) to make this also a part of the law was baulked at this time. It was done, however, by a decretal of Pope Siricius (385), Jovinian, a Milanese monk, striving in vain to stem the tide of authority and popular sentiment. The decretal of Siricius, not being generally received as of binding authority, was reimposed by Pope Gregory VII.; but the law as it now stood (that a priest could not marry after ordination, and had to put away his wife if he were married before), being systematically evaded or openly resisted, so far from being effectual, only tended to increase the existing moral corruption; and the profligacy of the clergy, which must have been in great measure due to this unnatural law, was one of the chief causes of the Reformation.

When at the Reformation the Protestants all declared against C., the subject was discussed in the Romish Church at the Council of Trent, and the majority decided in favour of it. According to the canons of the Romish Church, therefore, the two sacraments of Matrimony and Holy Orders so exclude each other, that he who receives the one must, as a general rule, renounce the other. The provisions regarding it are, that the four lower orders of the clergy are permitted to quit the profession and marry, but from subdeacon upwards they cannot do so without permission from the Pope. See Neander's *Kirchengesch.*

Cell (Animal). However varied in structure the different tissues of the animal body may be, it is now a recognised fact that all originate from a primary element termed a *C.* This important generalisation was first made regarding animal textures by Schwann, who followed quickly in the footsteps of the eminent botanist Schleiden, who first made the discovery that vegetable textures were derived from a primary C. The discovery was the commencement of the celebrated C.-doctrine—namely, that all structures originated in cells—and it must be regarded as the greatest ever made by the microscope.

According to the conception of Schleiden and Schwann, a C. may be defined as a microscopic globular body, consisting of an envelope termed the *C.-wall*, which encloses *contents*, in which

lies embedded a minute body called a *nucleus*, in which, in turn, there may be a still smaller particle known as a *nucleolus*. Since the days of these distinguished observers, however, the definition of a C. has become modified, as histological investigations revealed the existence of structures having certain of the properties of cells, without necessarily being possessed of wall, nucleus, or nucleolus. Schultze, Brücke, and Lionel Beale described cells which have no C.-wall. Max Schultze further described minute jelly-like particles of living matter, which, though they possessed neither C.-wall nor nucleus, still lived and multiplied. Thus a C., in the language of modern histology, may consist only of a small mass of contractile protoplasm. It is evident that an entirely new meaning has been given to the word C., and in one sense, the C. theory of Schleiden and Schwann has been abandoned, inasmuch as structures are now termed *cells* which do not fall within the definition they gave of that structure.

Size of Cells.—They may vary in size from the $\frac{1}{8000}$th of an inch to the $\frac{1}{120}$th of an inch. The smallest cells are probably the coloured blood corpuscles; the largest is the ovum, which is the parent of all the other cells.

Form of Cells.—The primary C. is spherical; but this form varies according to the degree and direction of compression, and the amount of room for expansion. Two well-marked varieties are found: (1) flattened, scale-like forms, such as pavement epithelium; and (2) elongated, narrow cells, such as columnar epithelial cells, involuntary muscular fibre cells, and certain nerve cells.

Composition of Cells.—Actively growing cells consist of an unstable albuminous compound, possessing frequently the property of contractility, and termed *protoplasm*, *bioplasm*, *cytoplasm*, or *sarcode*. Sometimes this substance is replaced by different kinds of matter, such as by a hard substance termed *keratine*, as in old epidermic cells, or by globules of oil, or by pigments, or, finally, by crystals.

The C.-Wall.—Sometimes, as already stated, there is no C.-wall. When it does exist, it is usually very thin, structureless, and without openings or pores which can be seen with the highest magnifying powers. The C.-wall is smooth or granular, or presents irregular elevations and depressions on the surface.

The Nucleus.—This structure is not soluble in acetic acid, and thus differs from the C.-contents and the C.-wall. It is quickly stained by colouring matters. The nucleus is smooth or granular on the surface. The nucleolus is a still smaller body, also not affected by acetic acid. It is supposed by some to consist of a globule of fat or oil.

Vital Properties of Cells.—Cells have the power of absorbing matter from the fluid or pabulum in which they exist, and of converting this matter into protoplasm, or into substances which are stored up in the interior of the C. They also appear to have the power of excreting materials which are either not necessary to the life of the C., or which may be injurious to it. Lastly, many of them have the property of contractility—that is, they may change their form. As an example of contractile cells, none can be examined more readily than the colourless cells of the blood. These movements are termed amœboid, from their resemblance to those of a minute microscopic aquatic organism known as the *amœba*. By means of these movements, the C. can take into its substance small solid particles which may afterwards be digested or dissolved; and, as was discovered some years ago by Von Recklinghausen, these amœboid cells can pass bodily through the interstices of living parts. (See INFLAMMATION.) Certain cells have contractile appendages attached to them termed *cilia* (see CILIA); while a third class appear to resemble a nucleus, having attached to it a long contractile filament, by the movements of which the body is propelled through the fluid. This phenomenon is seen in the spermatozoon. See SPERMATOZOA.

Multiplication of Cells.—Cells may multiply either (1) *indogenously*, C. arising within C.; (2) *exogenously*, by the C.-wall bursting, and new cells originating in the extruded contents; (3) *fissiparously*, by fission or division; and (4) *gemmiparously*, by a process of budding.

Classification of Cells.—The classification of C. adopted by Professor Hughes Bennett commends itself for its simplicity. It is as follows:—

I. *Normal Isolated Cells*, which never proceed beyond the C. form.

1. Lymph corpuscles.
2. Chyle corpuscles.
3. Blood corpuscles.
4. Nerve cells.
5. Fat cells.
6. Pigment cells.
7. Gland cells.

II. *Transitional Cells*, which may become so altered and arranged as to form a tissue.

1. Embryonic cells.
2. Fibre cells.
3. Epithelial cells.
4. Cartilage cells.

III. *Morbid Cells*, or those which are commonly found in diseased conditions.

1. Plastic cells.
2. Pus cells.
3. Granule cells.
4. Cancer cells.
5. Tubercle corpuscles.

Conditions of C.-Life.—The conditions favourable for C.-development are—(1) They must be in a nutritive fluid or *blastema*, from which they derive nourishment. (2) A moderate temperature—C.-life does not exist below zero or above 145° F. As a rule, cold checks while warmth encourages C.-growth. (3) They must have room for expansion, and (4) the C. must itself be in a healthy condition. If the C. becomes filled with fat or mineral matter, or if the C.-wall becomes so thickened by deposits as to prevent fluid matter from reaching the C.-contents, the structure ceases to grow.

Theories of C.-Development.—Various theories have been put forward to account for the origin of cells. In chronological order, the following are the chief of these:

1. *The Theory of Schleiden and Schwann*, 1839.—These observers stated that cells originated in an amorphous fluid or blastema, which was derived from pre-existing cells. The nucleus was first formed, and around it a C.-wall was slowly developed. The C.-contents then collected between the C.-wall and the nucleus.

The Theory of Goodsir, 1845.—This distinguished anatomist and physiologist was impressed with the physiological importance of the nucleus. The nuclei he termed *centres of nutrition* or *centres of germination*, and he supposed that such a centre exercised an influence over an area in its vicinity. He held that the nucleus was the primary and important element.

The Theory of Huxley, 1853.—He attaches importance not to the nucleus but to the C.-contents. In a homogeneous plasma, spaces or vacuoles are formed, and in these are found C.-walls, contents, and nucleus. The wall of the space he terms *periplast*, and the included matter, or nucleus and contents, *endoplast*; and he holds that all important changes occur in the periplast. Thus his theory is almost the reverse of that of Goodsir.

The Theory of Hughes Bennett, 1855.—This physiologist was almost alone in asserting that the primary organic element is not the C. as a whole, nor any part of the C. specially, but the individual molecules of which the C. is formed. Bennett's view is therefore generally known as the *molecular theory*. He held that cells may originate *de novo*, without the agency of pre-existing cells. Molecules group together to form a nucleus, and round this a C.-wall is formed, as Schleiden and Schwann described.

The Theory of Beale, 1861.—He holds that living tissues consist always of two portions, one living, active, and germinating, which he terms *germinal matter*, and the other dead, passive, and inert, except as regards chemical or physical changes, to which he gives the name of *formed material*. He states also that an ammoniacal solution of carmine stains deeply the germinal matter without affecting the formed material, and thus he differentiates between the two. The germinal matter of Beale is simply the nucleus, with which all histologists are acquainted, but the peculiarity of his theory is that all outside the nucleus is regarded by him as formed and dead. There is no proof at the present time that contractility of muscle is a purely physical act, and yet this phenomenon occurs in the formed material which Beale regards as dead. At the same time there can be no doubt that the matter, which is alive in the sense of taking up new pabulum from the blood, and elaborating this

into muscle, is the protoplasmic matter called the nucleus. This may be conceded without asserting that all outside of the nucleus is dead.

None of these theories are to be regarded as final. New discoveries may lead to change of view, but in the present state of science, biologists incline to the opinion that the primitive material is the living protoplasm or jelly-like matter, which, though derived from pre-existing protoplasm like itself, is capable of growth, assimilation, and also of modification into cells and all other tissues.

Cell (in botany), the more or less rounded, minute, bladder-like organs, of which a great portion of the plant is made up, and which, in the early condition of all plants, constitute the whole structure. These are of various shapes and sizes, but primarily consist of a wall of Cellulose (q. v.) lined by the primordial utricle, and containing in the interior a slimy fluid called Protoplasm (q. v.) and the nucleus (a minute more condensed portion of protoplasm), in addition to oils, sugars, acids, and the various other substances which give character to the plant or can be extracted from it, starch grains, Chlorophyl (q. v.), and frequently Raphides (q. v.), or crystals. Wood fibres and Vessels (q. v.) are only modifications of cells. Some plants, like the Red-Snow Plant (q. v.), consist of a single C. only, but which can perform all the functions of vegetable life. All cryptogamic plants, except ferns and other allies, are made up entirely of cells. The Pollen Grains (q. v.) are also cells. From its importance in plant life, the C. has been made the subject of most elaborate research, especially by German botanists, and a multiplicity of names applied by Nageli and others to the different parts, particularly of the C.-wall, which are only doubtfully useful to science, and in a popular work do not require to be mentioned.

Cell'e, a growing town of Prussia, province of Hanover, on the Aller, 15 miles N.E. of Hanover, with which it is connected by railway. It has a fine antique castle, the residence of the Princes of Brunswick-Laneburg, 1369–1705. Its old town-church contains the tombs of the family, as also that of Queen Caroline Matilda of Denmark, who died here 1775. C. does an active river trade with Bremen, chiefly in wool, timber, wax, and tobacco. It has important manufactures of waxcloth, soap, paper, printing-ink, paperhangings, cigars, &c. Pop. (1872) 16,126, of whom 671 were soldiers. In the beautiful neighbourhood there are several large suburbs. C. is the birthplace of the great agriculturist Thær, and of the poet Ernst Schulze.

Celli'ni, Benvenuto, a versatile and erratic Italian genius, sculptor, engraver, chaser, gold-worker, engineer, musician, and author, was born in Florence, 1500, studied music for some years, established himself with a gold-worker in 1515, but being implicated in an affray, he left Florence and travelled to Rome He returned to Florence, but engaging in another affray, was obliged a second time to fly to Rome, where Pope Clement VII. engaged him in the double capacity of artist and musician. He also found him useful as a soldier; for at the siege of Rome (1527) C. was the lucky marksman who shot down the Constable Bourbon, the besieging general, a service which, on his own authority, he also performed for the Prince of Orange when that general subsequently laid siege to the Castle of St Angelo. After a roving, fighting life, in which, however, he executed many splendid works, and won the friendship of the nobles to whom he had recourse whenever his customary free handling of the sword got him into difficulties, and after a lawsuit in which C., vexed with 'the law's delay,' effectually simplified matters and brought the cause to an end by taking again to the sword, ridding himself of his adversaries in the manner with which he was most familiar, he died at Florence, 25th February 1571. His bronze group of 'Perseus with the Head of Medusa,' at Florence, and his numerous portraits, attest his skill in high art; though his fame more securely rests upon the richness and beauty of the work in his cups, salvers, sword and dagger hilts, clasps, medals, and coins. His autobiography, which he commenced to write in 1558, is one of the most curious and valuable of biographies, as giving at once the personal details of an important career, and reflecting the morals and social life of Italy and France in the middle of the 16th c. The best edition of this work, entitled *Vita di B. C., da lui medesimo scritta*, &c., is by Tassi (Flor. 1829). In the beginning of 1876 a number of C.'s original papers, comprising inventories and accounts of sculptures executed by him at Florence, Fontainebleau, &c., were discovered in the monastery of the Campomazzo, and are to be published at Rome.

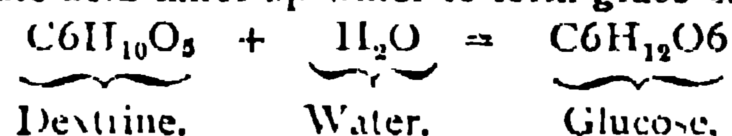
Cellular'es, a term sometimes applied to those cryptogamic plants which, like most fungi, lichens, and algæ, are altogether made up of cellular tissue, without fibres or vessels.

Cellular Tissue. This is the tissue found underneath the skin, and in the interstices of the structure of organs. It is usually known as *areolar tissue*. See AREOLAR TISSUE.

Cellular Tissue or Parenchyma (in botany).—Cells increase either (1) by the original cell dividing in two by *merismatic multiplication*, as it is called; (2) by the middle cell producing others in its interior; or (3) by gemmation or budding.

In one or in all of these ways, acting at once C. T., or the collection of cells in union with each other, is produced. By pressure the original more or less rounded form is altered, until the cells become, in most cases, more or less angular; in other cases, oblong or square. Various names have accordingly been applied to such C. T. according to the shape of the cells entering into its composition. But these names being practically unnecessary, do not call for repetition. The fluid passes from C. T. by Endosmose and Exosmose (q. v.), and in this tissue the whole life of the plant goes on.

Cell'ulose is the material composing the walls of the cells and vessels of plants. Linen, unsized paper, and cotton wool consist of C. in an almost pure condition. A substance closely resembling C., and by many supposed to be identical with it, is found in the tissues of certain marine animals belonging to the order *Tunicata*, and is called *tunicine*. C. is composed of carbon, hydrogen, and oxygen in exactly the same proportions as in starch, the formula by which the composition of both these substances is represented being $C_6H_{10}O_5$. C. differs from starch, however, in many important properties. It is white, tasteless, and odourless, insoluble in water, alcohol, ether, &c., but soluble in a solution of sulphate of copper to which excess of ammonia has been added. C. is coloured yellow by iodine, whereas starch is coloured blue by the same reagent. C. is dissolved in concentrated sulphuric acid, but if water be added to this solution, a substance is precipitated in white flocks (amyloid), which gives the same reaction with iodine as does starch. Paper soaked for a few moments in a mixture of two parts of oil of vitriol and one of water has its surface covered by a thin layer of amyloid, which causes it to be very tough and impervious to liquid: paper thus prepared is called Vegetable Parchment (q. v.). C. may be converted into glucose or grape-sugar by dissolving it in oil of vitriol, allowing the solution thus obtained to remain for some time undisturbed, then diluting with much water, and boiling. In this operation the C. is first converted into Dextrine (q. v.), and the latter by boiling with the dilute acid takes up water to form glucose.



$$\underbrace{C6H_{10}O_5}_{\text{Dextrine.}} + \underbrace{H_2O}_{\text{Water.}} = \underbrace{C6H_{12}O6}_{\text{Glucose.}}$$

The action of concentrated nitric acid, or of a mixture of that reagent with oil of vitriol, on C., gives rise to interesting derivatives possessing highly explosive properties. See GUN COTTON.

Cel'sius, the name of a Swedish family, several members of which have attained celebrity. Among these may be reckoned: 1. **Magnus C.**, born 16th January 1621, in Helsingland, died Professor of Astronomy, 5th May 1679. He is the discoverer of the Helsing runes.—2. **Olof C.**, his son, born 1670, died 1756, was Professor of Theology, and Provost of the Cathedral at Upsala. He was a great student of botany and Oriental languages, of which his *Hierobotanikon* (Ups. 1745–47) is evidence, and was the first to recognise the genius of Linnæus, whom he liberally aided.—3. **Anders C.**, nephew of the latter, and the most distinguished of the family, was born 27th November 1701, at Upsala, where he became Professor of Astronomy in 1730, and died 25th April 1744. His chief works are *Nova Methodus Distantiam Solis a Terra Determinandi* (1730), and *De Observationibus pro Figura Telluris Determinanda in Gallia Habitis* (1738); but he is best known as the constructor of the centigrade thermometer.—4. **Olof von C.**, son of the Cathedral Provost, born 1716, became Professor of History at Upsala, 1747, was raised to the rank of a noble in 1756, made Bishop of Lund in 1777, and died in 1794. He founded (1742)

the first literary society in Sweden, *Tidningar-om de Lärdas arbeten*, and wrote a *Svea-rikes Kyrko-Historia* (Stockh. 1767), besides histories of Gustavus I. (2 vols. 1746-53) and of Eric XIV. (1774).

Cel'sus, an Epicurean philosopher under the Antonines. Origen, in his answer *Contra Celsum*, calls him the author of an attack on Christianity entitled *Logos Alethes* ('The True Account'); but Neander thinks this a mistake. C. was the first to call in question the Mosaic authorship of the Pentateuch, and asserted that Christianity was irreligious and immoral, because founded on an anthropopathic idea of God, and that the disciples of Christ had craftily given currency to an exaggerated picture of the life of a good man.

Celsus, Aulus Cornelius, a celebrated Roman physician who flourished in the reign of Tiberius. Of the various works which he composed on philosophy, rhetoric, agriculture, military art, and medicine, there have only come down to us the eight books of his *De Medicinâ*, of which there have been several good modern editions, as that of Targa (Pad 1769) and of Daremberg (Leips. 1859). Kissel, in his *Monograph on C.* (Giess. 1844), has also made a collection of the fragments of his other writings. An English translation was published by Grieve (1756).

Celt (Gael. *celtis*, 'a chisel') is the name given to one of the most ancient and primitive forms of tool or weapon used by the human race. The C. has an axe or wedge form, and was used with a handle probably much in the same manner that the axe is employed at the present day. The most ancient examples, of which large numbers are found in the tumuli, lake-dwellings, kitchen-middens, and cave-dwellings of the earliest members of the human family, were only roughly fashioned in hard stones of various kinds. The stones used for C.-making were selected with great care and skill, toughness and capacity to take a fine edge being chiefly regarded, these properties being found in flint, felstone, and basalt, which were all employed. It is remarkable that although no deposits of jade are known to exist or to have ever existed in Europe, celts of that mineral are by no means rare; and it is assumed the material must have originally been obtained from the E. of Asia. As we approach the period now known as the Bronze Age, stone celts gradually become finer in shape, more elaborately finished, and even polished, and there is no doubt that they continued to be used long after the casting of weapons in bronze was understood and practised. Many of the early metallic celts are composed of almost pure copper, which is not so hard as the bronze more commonly employed. Numerous remains of the moulds in which celts were cast have been found, and the forms they assumed were very numerous. They varied in size from an inch to about a foot, and were in some cases ornamented with ridges, dots, or lines. Bronze celts are divided into three classes according to the manner in which the weapon is attached to the shaft. In the first type, which is supposed to be the most primitive, the tapering end of the weapon is made to pass through the shaft; in the second form, the handle is bent, and two tangs projecting from the C. fit on the bent portion and are lashed to it; and in the third the end of a bent handle passes into a hollow part at the back of the weapon. The use of stone weapons of this form appears to have been universal among the primitive savage races of mankind, and they are yet found among many uncivilised tribes.

Celtibe'ri, a brave and powerful people of Hispania, who occupied the great plateau now known as Old and New Castile. They are believed to have been (as their name implies) a mixed race formed by an amalgamation of the primitive Iberian stock of the Peninsula, which was probably non-Aryan, with the earliest Celtic invaders. According to Strabo, they were divided into four tribes. The stubborn resistance of the C. to the Roman arms is the most heroic episode in ancient Spanish history, and the capture of their capital, Numantia, by the younger Scipio (B.C. 146) was only achieved after hunger had reduced the citizens to the last extremities.

Celtic Nations, The. Herodotus (B.C. 450) speaks of a people whom he calls *Keltai*, 'who, next to the *Kynetæ*, were the most western population of Europe;' and he further mentions them as mingling with the Iberians, who dwelt around the river Ebro in Spain. This is the first notice we have of the *Keltai*, as they continued to be called by Greek writers. The Romans generally called them Galli; a very numerous branch of themselves took the name of Gäel, which they retain to the present day. *Kel* or *Gal* appears then to be the root of this name; but no probable explanation of its meaning has hitherto been reached. It is not known to what language it belongs, nor whether it was a name adopted by the race themselves or imposed by strangers. That the Celts are a branch of the great Aryan or Indo-European family of nations is placed beyond all doubt by their language, which bears close resemblance, alike in grammatical structure and vocables, to Sanskrit, Greek, Latin, Teutonic, &c. Further, they were the first of the Aryan races to leave the great common cradle in the E. for Europe. They were driven onwards and sideways by succeeding waves of Teutons, Slavonians, and others; but we have no means of forming even an approximate guess of the period at which any of these movements took place. The Celts were the first Aryan settlers in Europe, and it seems probable that they found portions of it waste and unoccupied. It is at the same time maintained by many ethnologists that, in Spain, in the French Pyrenees, and in Britain, they found before them a Turanian people, the remains of whom are still to be seen in the Lapps and the Finns of the N., and in the Basques (see BASQUE PROVINCES) or Euskarians of Spain and Portugal. It is evident that, at the very dawn of history, these two races were contemporaneous occupants of Spain, and of some other places in Europe, but it is difficult to determine which of them was the first in possession. When we enter on the historic period, we find ample proof that the Celts ruled in Britain and in Ireland, in France, Belgium, Switzerland, the N. of Italy, and various portions of the S. of Germany. They had settlements in other quarters of Europe—in the S. of Italy, in Spain, Portugal, and elsewhere; but it is impossible to determine the exact extent of their possessions, or to ascertain whether in these cases they were temporary intruders or permanent settlers.

We see the C. N. thus widespread in Western Europe, and for a long period holding their own against Romans, Teutons, and all their neighbours. More than this, they often carried terror and devastation into their enemies' territories. In B.C. 398, Brennus, king of the Cis-Alpine Gauls, plundered the city of Rome, and burned much of it to the ground. About a hundred years later, three Gallic tribes, passing the Alps, took possession of Illyria for a time, invaded Greece, plundered the temple of Delphi, overran Thrace, and crossing the Bosphorus, made extensive conquests in Asia Minor, finally settling in the region, to which they gave their own name of *Gal*atia, or *Gallo*-Græcia. Here they retained their own language and their distinctive character down to the 5th c. of the Christian era, after which we lose all separate trace of them.*

In the 2d and 3d centuries B.C., the Celts possessed very extensive power in the W. and S.W. of Europe. Before this period they had yielded in many instances to the encroachments of the Teutonic tribes; but it was the resistless and ever-growing power of Rome before which they were fated to go down. Galatia was made a Roman province in the reign of Augustus. Long before this time Cis-Alpine Gaul had been incorporated with Italy, and the final blow was given by Cæsar (50 B.C.) in the conquest of Gaul, including Helvetia and Gallia Belgica. He invaded Britain twice over, but met with such resistance as prevented him from making any permanent settlement in the island. A hundred and thirty years later the whole southern portion of the kingdom was subdued by the Roman general Agricola. The northern parts of Scotland, however, maintained an unceasing warfare with their great enemies, and retained their independence, being the only country attacked by the Romans which was able to make that boast; though it cannot be denied that the remoteness of the region and the poverty of the soil contributed to this result no less than the valour of the natives. Ireland was never invaded, and for hundreds of years after this remained in the undisturbed and prosperous possession of its native Gael.

We must now glance for a moment at the different effects, in regard to a distinct ethnological existence, which these conquests produced on the Celts in the different parts wherein they resided. In Asia Minor, as well as in the S. of Germany, they became absorbed in the surrounding population, and speedily

* It may be well to say that this account of the *Gal*-atians is confirmed by such ethnologists as Niebuhr, Rawlinson, and above all, by the great authority in Celtic matters Zeuss, as also by such theologians as Conybeare and Dean Lightfoot.

lost their language, as well as every characteristic of a distinct race. In France, where we know the immense majority of them were allowed to retain possession of the soil, they for a time adopted the language of their Roman conquerors; but when the northern invaders—Franks, Allemanni, &c.—in their turn seized the country, the provincial Latin, mixed with their ruder tongues, produced modern French. The N. of France alone, known as Armorica or Brittany (see BRETAGNE), clung to its old Celtic speech, and there it is spoken to this day by a population numbering more than a million. In Britain the Romans never attempted to extirpate the original inhabitants more than they did in other conquered countries; and the heathen English, fierce as they were, do not seem to have in this respect differed from their predecessors. They took possession of the fairest and best portions of the country, apparently retaining the old population as their subjects, or driving into remote corners of the land those who refused to serve them. There are traces of the Celtic language having been spoken in Herefordshire in the reign of Henry II., in Devonshire down to the time of Elizabeth, while in Cornwall it continued to be the language of the inhabitants until the latter part of the last century. In the Principality of Wales, subdued by England in the reign of Edward I., it is still spoken by hundreds of thousands, preached in hundreds of churches, and written in newspapers, as well as in literary periodicals. In the Isle of Man, also, it was till recently the almost universal language of the people, and is still spoken. In Scotland, Celtic continued to be the language of the kingdom down to the reign of Malcolm Canmore in the 11th c. After his marriage with the English princess Margaret, English gradually became the language of the court. The sons of Margaret, viz., Edgar, David I., Alexander I., and, in truth, all the subsequent rulers of Scotland, were anti-Celtic in their policy; and so English continued to advance from its basis in Lothian, until now it is spoken by all the inhabitants of Scotland, except about 300,000 in the W. and N.W. Highlands, who still cling to the old Gaelic. In Ireland, which was invaded by England in the 12th c., and finally subjugated in the 16th, though the Gaelic has been, from the beginning of the English invasion, denounced and discountenanced in every way, it is still dearly cherished by fully three millions of the people, who speak no other tongue; and in the British colonies, as well as in the States of America, it is spoken by thousands whose ancestors dwelt in Wales, in the Highlands of Scotland, or in Ireland.

The Celtic race has hitherto, for convenience' sake, been spoken of as one. But it is necessary to state that at an early date it was divided into two leading branches, speaking dialects differing widely from each other, probably as widely as the modern English differs from modern German, yet so nearly allied as to prove that those using them belonged, beyond doubt, to the same stock. The one is known as Gaelic, and is still spoken, with variations which warrant three subdivisions, in Ireland, in the Scottish Highlands, and in the Isle of Man. The other, known as the Cymric, is spoken in Wales and in Brittany, and was the language of Cornwall. This is also subdivided into British, Armoric, and Cornish.

History gives us no information as to the period when the Gael and the Cymri separated from one another, nor of their conduct towards each other after separation; but a careful study of the topographical names of the various countries which they occupied reveals several interesting facts concerning them, though these are only of a relative, not of an absolute character: and here the names of rivers, being more permanent than those of cities, or even of other natural features of a country, afford us the most trustworthy information.

It appears, then, from the researches of Diefenbach, Keferstein, Mone, Duncken and others, that the Gaelic branch was the most numerous people in ancient Germany, and the original settlers in the greater part of it, displacing no preceding settlers, for no Cymric or Teutonic names are found which have been changed according to the idiom of the Gaelic language. But Gaelic names changed according to Cymric rules, or, to use a barbarous word, *Cymricised*, are found over a portion, though not by any means the whole, of the Celtic-German area: and this proves that a smaller band of Cymri followed their Gäel cousins, and subdued or expelled them, settling themselves down in their place. Then came the Germans, who further changed the names that had previously passed through both the Celtic dialects. The names in Northern Italy are principally Cymric, in Southern Italy, Gaelic. Professor Newman, some think, has proved what was long ago contended for by Mr Grant of Corriemony in his very ingenious little work, *Origin of the Gäel*, (Edinb. 1814), that Gaelic entered largely into the language of the founders of Rome, and that the Sabines were entirely a Gaelic race. France was principally Cymric, nor are the stories of Brittany having been peopled by exiles from Wales of any weight; for a Cymric topography is to be found almost everywhere throughout ancient Gaul, as well as in Britain. The Gäel again, beyond question, occupied *Gal*-atia. Several Gaelic names are to be found throughout England; but the Cymric are in an immense majority from S. to N., though it is very interesting to observe a thin line of Gaelic names extending across the island from the Thames to the Mersey, as if indicating the path by which the Gäel, probably urged onwards by wave after wave of the stronger Cymri, sought refuge in Ireland, where their descendants still remain. In Scotland, the Cymri extended from the S. as far as the Highlands of Perthshire: beyond these the Gael dwelt, and continue yet to dwell.

Religion and Laws.—Cæsar, in his sixth book *De Bell. Gall.*, says that all the Gauls were much given to religious observances, and it is remarkable that the whole Celtic race, wherever situated, and whatever their form of religion may be, continue to this day to manifest very much of a devotional spirit, and a strong love of show and excitement in their religious worship. Very little, however, is accurately known either of their religious views or rites in the times of old. Their priests were called Druids. According to Cæsar, they taught much sacred lore to their pupils, through verses which were committed to memory, but they allowed nothing sacred to be written; so we depend, for our knowledge of this subject, on the accounts of strangers and enemies, or on vague traditions and faint resemblances of some of their rites still preserved among their descendants. It is worth recording that not Cæsar alone, but Strabo and Lucan also, speak of the Druids as more learned than their neighbours, and possessing a profound spiritual discipline. They are said to have taught the immortality of the soul, as also its transmigration, and to have carefully studied both astronomy and geography. The names of several Greek and Roman deities are mentioned as the objects of their worship, and human victims are said to have been frequently offered by them.

How far these accounts are to be depended on it is impossible now to determine, but it is certain that the Druids held the sun among the principal objects, if not the sole object, of worship; that he was known by the name of Bel or Baal; that two great annual festivals were held in his honour, when the fire on every hearth throughout the land was extinguished, and every house, occupied by high or low, was relighted with consecrated fire given by the priest. One of these festivals was held in the beginning of winter. It is still known in Gaelic as *Samhuin-Sāmh-Theine*, or 'the fire of peace,' and is throughout Scotland generally observed with many superstitious rites, the meaning of which is altogether lost. The other was held on the 1st of May, and is known as *Beltane* or *Beltein* (q. v.), 'the fire of Baal.' There are various places in the Highlands where, if a person allows his fire to die out about the beginning of summer, he will in vain go for a kindling to any of his aged neighbours. The taking fire out of a house at this season is regarded as a dangerous thing, certain to bring evil on the house sooner or later. In Orkney, in Perthshire, and Banffshire, young people still kindle fires on hill-tops in the beginning of summer, rush through the flames, or roll cakes through them, which are afterwards carefully divided and eaten by the company; and even in the southern parts of the kingdom, there are many who still go forth before sunrise 'to doon their observance to May' (*Knightes Tale*, l. 642), quite unconscious that they are still maintaining a part of the once great Druidical sun-worship.

Groves of oak are said to have been the favourite places of worship with the Druids, and what may well be called 'groves of stones' were also used by them as temples. The remarkable 'circles of stones,' commonly known as 'Druidical circles,' are still to be seen, and of most imposing dimensions, in the most distant places which were inhabited by the Celts. Stonehenge and Avebury in England, Stennis in Orkney, and Callernish in the remote island of Lewis, are the most striking remains of these 'sun-temples' in Britain; but there are hundreds of smaller ones, and Carnac, in the N. of France, far surpasses in magnitude any to be seen elsewhere.

It is singular that some learned men have of late asserted that these circles were never used as temples, but were merely monuments of the dead. They base their assertion on the circumstance that graves have been found in the neighbourhood of many of them. Now, it appears to be just as reasonable for a stranger who, on a week-day, visits one of our old churches, whose floors are covered with flags marking the graves of those who sleep underneath, to say that these churches and cathedrals are mere monuments to the dead, having nothing to do with the devotions of the living. Were there nothing else to throw light on this point but the Gaelic language as spoken to the present day, it would prove abundantly that these 'stone circles' were places of Druidical worship, and that the Druids were held, not in respect only, but in deepest reverence and awe, as persons endowed with supernatural power.

Laws and Institutions.—No long time has passed since to speak of written laws and enlightened institutions having been known among Celts, especially Irish Celts, fully eight or nine centuries back, would have raised a laugh of contemptuous scorn wherever the English language is spoken; but such laws and institutions did exist among them nevertheless. Every tradition we have on the subject confirms what Cæsar says about the absolute power of the Druids, not in religious matters only, but in civil and criminal jurisdiction as well. They exercised despotism as extensive and as thorough as ever belonged to any set of rulers; yet it must have been in many respects a wise and beneficent despotism. The Irish 'Brehon Laws,' as they are called, now published at the expense of the British Government (as ought to have been done three centuries back), were written at least 800 years ago, nearly 400 years after Ireland had embraced Christianity; but they embody many laws which by consuetudinary usage had acquired the force of statute long before Christianity had been preached in the country, going far back into Druidical times.

It is impossible within our narrow limits to attempt the briefest summary of those most interesting volumes, now, through translations and explanatory notes, accessible to all who choose to examine them; but it is not too much to say that, both in civil and criminal law, they are in point of equity and comprehensiveness very far in advance of any legislative code which at that period, or for centuries after, belonged to any modern nation of Europe. We may remark that, in regard to one very important point, the ownership of land, these Brehon Laws clearly show that in Ireland, as was the case universally among the Celts, the soil was originally held as a tribal possession; the chief or landlord, to use modern terms, was regarded in the light of a public servant, to whom certain payments were due as the chief magistrate of the community; but as long as the members of this community discharged their relative duties, he had no power to deprive them of their holdings. The new laws regarding the ownership of land, which were made after the great French Revolution, showed that the memory of the old Celtic tenures had not died out in France even in the 18th c., and the new title given to their ruler—Emperor of the French, instead of Emperor of France—shows that they remembered the old patriarchal relation of clanship or children to a common father; while the ever-festering and running sore of agrarianism in Ireland proves the conviction to be still strong and ineradicable there, that the old occupants of the land have right to continuous occupation while they pay a reasonable rent. Sir Henry Maine's interesting work on the history of early institutions, proves amply that at a certain stage of progress in the social condition of every nation, Celtic, Teutonic, or Hindu, these views of land-tenure are held and acted on. See article Brehon Laws for a brief description of the matters with which ancient Celtic legislation concerned itself.

Language and Literature.—This part can only be touched on here, but the reader is referred to articles Cymric Language and Literature, Gaelic Language and Literature, for a more detailed account.

Since the days of Sir William Jones, all philologists admit the Celtic to belong to the Aryan or Indo-European family of languages. What distinguishes it from all its sisters is its inflection by changes on the initial consonants of its nouns and adjectives. These changes are in Irish-Gaelic called *eclipsis*, in Scottish, *aspiration*, and in Cymric, *mutation*.

The extent of Celtic literature still existing is immensely more than English readers are generally aware of. In Welsh, the *Myvyrian Archæology*, published by Owen Jones, occupies volumes. The four ancient books of Wales, published with an English translation and a most learned introduction by Mr Skene of Edinburgh, contain poems composed about the 6th c., and committed to writing in the 12th, while there are hundreds of MSS. still unpublished.

For an account of the MS. treasures of Ireland, we must refer to the works of the truly able and industrious Professor O'Cuory (Dubl. 1861). He shows that there are many thousand pages of the most miscellaneous description—historical, theological, and scientific—still preserved, mainly in the Trinity College, Dublin, but in many other libraries also, both British and foreign. These have been written from the 9th to the 16th centuries. The Government of the country, as already observed, are publishing several of them. The Royal Irish Academy is also showing liberality and activity in the same direction, and the time is not far distant when full justice will be done to the learning which flourished in Ireland during what was well called in other kingdoms the 'dark ages.'

In Scottish Gaelic there is a small collection of MSS. in the Advocates' Library, Edinburgh, some of which belong to the 12th c. The *Book of the Dean of Lismore* was written by the middle of the 16th c. There is a large number of songs from the middle of the 17th c. to the present day, some of high poetic merit, others sufficiently commonplace. There is one volume of truly beautiful prose by the late Rev. Dr Norman Macleod, of St Columba, Glasgow, but Ossian (q. v.) is the main name connected with Scottish Gaelic literature. All that need be said here is, that the poetry attributed to him is, in the opinion of competent judges, unsurpassed in its combination of sublimity with tenderness, and that, while few judicious men will maintain that Macpherson acted faithfully in publishing from MSS. collected by him, fewer still will *now* assert that these poems were composed by him in English, and afterwards translated into Gaelic. They contain abundant internal proofs of the Gaelic being the original, and there is every reason to conclude that *Ossian* contains, in spite of Macpherson's crooked procedure, genuine fragments of the old heroic Caledonian poetry.

The C. N. which at one time had the chief place in all Western Europe have now passed away, but they have necessarily had a very great influence in forming the character of those who now occupy their old places; and in estimating the amount of that influence, it must be remembered that, while they have perished as nations, they have not perished individually. They were neither slaughtered nor banished by those who successfully invaded their lands,—Romans or Teutons. It is needless to state that there is a very great proportion of Celtic blood in France, and everything favours the supposition that there is an immense deal more of it in England than is generally supposed. In his *Words and Places* (2d ed. p. 243), Isaac Taylor says, 'These facts, taken together, prove that Saxon immigrants, *for the most part*, left the Celts in possession of the towns, and subdued, each for himself, a portion of the unappropriated waste. It is obvious, therefore, that a very considerable element of Celtic population must, for a long time, have subsisted side by side with the Teutonic invaders, without much mutual interference. In time the Celts acquired the language of the more energetic race, and the two peoples, at last, ceased to be distinguishable.' In Scotland the Celts were never to any great extent displaced.

Whatever, then, be the character of the present mixed race inhabiting Britain, a considerable share of it necessarily belongs to the strain of Celtic blood which runs in their veins. Matthew Arnold's opinion of what this share is, is sufficiently high to satisfy the most ardent Celt. He speaks of steadiness, self-reliance, and perseverance as the good qualities of the German, in all of which the Celt is very deficient. On the other hand, the German is heavy, commonplace, humdrum, destitute of sentiment and wit. This may be a grotesque exaggeration of some Germanic traits, but none can doubt that the Celt is particularly strong in sentiment and wit, in reverence for all that is great and sacred, strong in imagination, fond of poetry and of music, and brave even to rashness. Mr Arnold quotes with approbation from Mr Morley, who says that it is the Celtic mixture alone which has enabled German England to produce such a poet as Shakespeare. If the Celt, then, has added grace to the vigour of the Teuton where the two races have been blent into one, he has a claim to respect and admiration which has not always been conceded.

Cel'tis. See NETTLE-TREE.

Cem'bra Nut and **Cembra Hive.** See PINE.

Cementa'tion, the process by which Blister Steel (q. v.) is made.

Cements' (Fr. *ciment*), factitious compounds for joining closely and firmly together the surfaces of homogeneous or heterogeneous bodies. C. are used liquid, semi-liquid, or plastic; and when placed in a thin layer between the surfaces to be united, they quickly dry and harden, and, by adhesion, effect a strong union. There are many kinds of C., of very varying composition, to suit diverse applications, but all may be embraced in three classes—(1) stony and hydraulic C.; (2) asphaltic or bituminous C.; and (3) resinous, glutinous, and oily C. The first class comprehends architectural and building mortars, as common mortar, Portland cement, Roman and other hydraulic C., which have lime for their bases. (See MORTARS and MASTICS.) The second class deals with those C. that are prepared from natural asphalt by pulverising and melting it, and combining with it pitch, chalk, sand, &c., in varying proportions. They are extensively used for street pavements, lining water reservoirs and cisterns, as mortar in the foundations of buildings to prevent dampness, &c. (See ASPHALT.) The third class is by far the most numerous, and it is impossible to enumerate here the numberless recipes for their preparation, or detail their uses in everyday handicraft. We subjoin from the host of recipes a few of the more useful kinds, referring for fuller details to Cooley's *Cyclopædia of Practical Receipts* (5th ed. Churchhill, Lond.), and Spon's *Workshop Receipts* (Lond. 1873). (See GLUE and PASTE.) As a rule, the least possible quantity of cement should be applied, as a closer and consequently stronger junction is thereby effected.

Diamond or Armenian Cement, for repairing fractured glass, earthenware of all kinds, &c.—Dissolve 15 to 20 grains of gum-mastic in a small quantity of alcohol, add 2 oz. alcoholic solution of isinglass (previously softened in water, and two small pieces of gum-ammoniacum; mix the whole, and keep closely stoppered; gently heat before use. This most valuable cement is used by Armenian jewellers to fasten diamonds to metallic surfaces, and is even capable of uniting surfaces of polished steel.

Electrical or Philosophical Apparatus Cement (Singer's), for connecting articles of brass and glass, &c.—Resin, 5 parts; beeswax, 1 part; calcined red ochre, 1 part; dry plaster of Paris, ¼ part; mix by applying heat.

Acid Proof Cement.—Form a putty with concentrated solution of silicate of soda and powdered glass; suitable for corks of jars, &c. A syrupy solution of shellac in benzole, and of caoutchouc in the same, mixed together, resists chlorine.

Leather Cement.—Dissolve gutta-percha in bisulphide of carbon to the consistence of treacle, thin down parts to be joined, and spread cement well into the pores of the leather, then heat, press, and hammer together.

Cutler's Cement.—Resin, 4 parts; beeswax, 1 part; brick-dust, 1 part; heat and mix intimately, and apply in liquid state.

Optician's Cement, for temporarily fastening lenses, &c., while grinding or polishing, adapted also for lapidary use.—Resin, 4 parts; wax, ½ part; calcined whiting, 4 parts.

Iron Cement, for joints of pipes, &c.—1 part each of sal-ammoniac and flowers of sulphur, and 16 parts of cast-iron borings or filings; mix well in a mortar and keep dry. When required for use, mix 1 part of the powder with 20 parts clear iron-filings, and incorporate the whole into a stiff paste with water. A cement containing the above ingredients—flowers of sulphur, sal-ammoniac, and iron-filings—in equal parts, triturated in a mortar, and rendered plastic with raw linseed oil and white lead, is, according to Klein, well adapted for aquaria. Finely-sifted wood-ashes and powdered clay, in equal parts, with a little salt and water, sufficient to form a stiff paste, form an excellent covering for the joints of ovens and iron stoves.

Miscellaneous C.—Quicklime beat into a paste, with equal parts of the white of egg and grated cheese; for marble and alabaster. Portland cement, 12 parts; slaked lime and fine sand, 6 parts each; infusorial earth, 1 part; make into a thick paste with silicate of soda; for broken stone ornaments, steps, &c.

Cem'etery (Gr. *koimeterion*, lit. 'a sleeping-room'), a place for the burial of the dead, distinct from the churchyard, and one of the most beneficial arrangements for the protection of the health of cities and towns made in modern times. The primitive Christians constantly used burial-places for purposes of worship, but to bury in churches was a custom of later date, and was frequently denounced. The privilege was first conceded to princes and priests, and the laity subsequently claimed it. In all Mohammedan countries, the C. is a striking feature in the neighbourhood of cities. In Europe, celebrated public burying-grounds were consecrated at Naples, Bologna, and Pisa. (See CAMPO SANTO.) Père la Chaise at Paris, named after a confessor of Louis XIV., and first used in May 1804, gave the modern impetus to this arrangement for interring the dead. Kensal Green C., in London, opened 2d November 1832, was the first in England; the Necropolis, in Glasgow, opened March 1833, the first in Scotland; while Glasnevin, Dublin, was the earliest in Ireland. There are now few considerable towns in Great Britain near which there is not at least one C. They are also common in other European countries; and in the United States there are cemeteries of great elegance and extent, such as those at New York and Philadelphia.

Cen'ci, Beatrice, executed 11th September 1590, for alleged complicity in the murder of her father, Francesco Cenci, a wealthy Roman noble, who, after being married a second time, conceived an unnatural hatred to his children by the earlier marriage, of whom Beatrice was one. Inspired at once by hate and incestuous passion, Cenci forced his daughter to submit to his brutal desires. The girl sought redress of Pope Clement VII., and on being refused, she, together with her stepmother and her brother Giacomo, planned and executed the murder of the unnatural father. All were condemned to death. In the Barberini Palace, Rome, a beautiful head, by Guido, is shown as the portrait of B. C. Her story, written by a contemporary, was first published in the original at Rome in 1849, but a German translation appeared at Leipsic in 1840 under the title of *Briefe von einem Florentiner*. More recently the history and trial of B. C. has been handled by Scolari (Mil. 1856) and Dalbono (Nap. 1864). It forms the subject of Shelley's famous tragedy, and also of a romance by Guerrazzi.

Ceneda, an ancient episcopal city of Italy, 21 miles N. of the city of Treviso. Rich and populous under the Venetian republic, it is now decayed, and has little more than 8000 inhabitants.

Cenis, Mont, or **Monte Cenisio**, a pass of the Cottian Alps, between Savoy and Piedmont, the highest point of which is 6775 feet above the sea. The pass was used from the earliest times, but the road was bad and dangerous. In 1810 an excellent road, begun by the orders of Bonaparte in 1803, was completed at an expense of £300,000. By this Napoleon III. sent his troops into Italy in his campaign against Austria in 1859. The most remarkable tunnel in the world is that of M. C., fully 7½ miles long, begun in 1857, and completed in December 1870, by which the railway systems of France and Italy are connected.

Ceno'bites. See MONACHISM.

Cen'omyce. See REINDEER MOSS.

Cen'otaph (Gr. *kenos*, 'empty;' *taphos*, 'a tomb'), a monument or tomb erected in memory of the dead buried elsewhere, or not found for burial—*e.g.*, those who perish at sea. A tomb built during lifetime for subsequent burial has latterly come to be called a C.

Cen'ser (Fr. *encensoir*, from *incenser*, Lat. *incendere*, 'to burn'), a vessel used for burning and wafting incense. The Hebrew C. was a portable metal vessel which received from the brazen altar burning coals, on which incense was sprinkled by the priest, who conveyed it to the golden altar, or altar of incense, on which it was offered up morning and evening. Solomon prepared censers of pure gold, and throughout the great Day of Atonement a golden C. was used. In the Greek Church the C. is wafted by the ministering priest. It is called a *thurible* (Lat. *thuribulum*, from *thus* or *tus*, 'incense') in the Roman Catholic Church, and the acolyte who carries it is called a *thurifer*.

Cen'sors (lit. 'reckoners,' 'valuators,' from the Lat. *censere*, 'to count, assess,' &c.), were two magistrates of high rank and authority in the Roman republic, whose duty was originally to take the *Census* (q. v.), or register of the citizens and their property.

Special magistrates were not appointed for this purpose till B.C. 443. At first they were chosen exclusively from the patricians, but in B.C. 339 it was enacted that one of them must be a plebeian; and in B.C. 131 both were for the first time plebeians. The C. were elected in the *comitia centuriata*, and exercised a general control over the morals of the citizens. Hence they possessed peculiar dignity. Their own sense of right was their sole guide in exercising their functions. The office continued till B.C. 22, but sometimes during the 421 years of its existence there were lustra in which no C. were chosen. In addition to the duties already mentioned, the C. were intrusted with the administration of the public finances, including the superintendence of the public buildings and the construction of new public works. Their duties are summarised by Cicero (*De Leg.* iii. 3). As possessed of the *regimen morum*, or supervision of public morality, they exercised a function similar to what is now called public opinion, and hence they were both revered and dreaded.

Cen'sorship of the Press is a term denoting the system regulating publication in countries in which the press is not free. Previous to the Reformation the clergy in England claimed a share in the C. of the P. in all matters connected with religion. At the Reformation this claim of right was held to have vested in the crown. It was exercised by the Long Parliament, and established by Act of Parliament in the reign of Charles II. It was continued at the Revolution of 1688, but in 1693 the House of Commons refused the re-enactment. See COPYRIGHT, LAW REGARDING; LIBEL, LAW OF; BOOK TRADE; PRESS, FREEDOM OF THE; OBSCENE PUBLICATIONS; CONTEMPT OF COURT; CONTEMPT OF PARLIAMENT.

Cen'sus is a Latin word denoting the register kept by the *Censor* (q. v.) of the citizens and of their property. In modern parlance it means the periodical enumeration of the inhabitants of a country. In Great Britain this has been made decennially since 1801. In Ireland, the first attempt to take the C. was made in 1811, but it was not considered successful, nor was that of 1821. In 1831 it was supposed to be more accurate, and each subsequent decennial C. has been considered trustworthy in its results. The enumeration for England and Scotland is made under the authority of the Registrars-General. (See REGISTRAR-GENERAL.) Each house is visited by an enumerator, who enters the information collected by him in a book, which, after careful revision by the local registrar and some other qualified officer of the town or county, is transmitted to the C. office. The schedules for the C. of 1871 give the 'name, sex, age, rank, profession or occupation, condition, relation to head of family, and birthplace of every living person' who passed the night of Sunday the 7th April in the house. The French C. is taken once in five years, the last being in 1872; some European countries, as Belgium (last 1873), have a triennial C.; others are very irregular: Spain, for example, has not taken one of the towns since 1800. That of the United States is, like the English, once in ten years, the last being in 1870. In the U.S. the practice exists of particular States, and in England of particular towns, taking a C. for themselves at shorter intervals than ten years. The first great general C. of India was completed in the beginning of 1874.

Cent (Lat. *centum*, 'a hundred'), a common name for a coin. Thus there are the American, the Spanish, and the Dutch cents, being respectively the $\frac{1}{100}$ part of a dollar, real, and guilder. The French *centime* = $\frac{1}{100}$ of a franc. The Italian *centesimo* = $\frac{1}{100}$ of a lira.

Centau'rea, a genus of plants of the natural order *Compositæ*, containing many annual and perennial herbaceous and half-shrubby plants, including some common weeds, such as the knapweed or horse-knot (*C. nigra*) and *C. Cyanus* (the blue-bottle or corn bluebottle), the water distilled from the blue flowers of which were at one time greatly valued as a cure for weak eyes. With alum they give out a fine blue dye. *C. montana*, the large bluebottle, is a perennial species, a native of Central Europe, but common in our gardens. Sweet Sultan (*C. moschata*), of the Levant, is also a garden plant in Britain. Among other species may be enumerated *C. macrocephala, C. dealbata, C. Ragusina, C.* (*Plectocephalus*) *Americanus*, and *C. depressa.*

Cen'taurs ('bull-goaders'), according to the Homeric legend, were a hirsute savage race dwelling between Pelion and Ossa, in Thessaly, who were extirpated in a war with the Lapithæ; later mythologising accounts—*e.g.*, that of Pindar—represent them as monsters, half human, half equine. The notion of their twofold nature may have arisen from the neighbouring tribes regarding the Thessalian bull-hunter and the horse he rode as constituting a single personality.

Centau'rus, one of the constellations of the southern hemisphere, so called because in the celestial globe it assumes the double form of a *centaur*. It contains two stars of the second magnitude, both in the head and shoulders, which are the only parts visible from Britain.

Centen'es. See TENREC.

Cen'tering of an arch, the framework (generally of timber) used to support the arch during construction. The C. is removed within as short a time after the keystones are in place as has been sufficient to allow the mortar to harden.

Cen'tigrade. See THERMOMETER.

Cen'tipede (*Scolopendra*), a genus of *Annulose* animals belonging to the class *Myriapoda*, and included in the order *Chilopoda* of that group. They are carnivorous in habits, feeding on insects, earthworms, &c.; the legs number from fifteen to twenty pairs. The antennæ are composed of not less than fourteen joints, but the number may also exceed forty in some cases. The mouth is provided with a pair of mandibles, with *palpi* or organs of touch, a *labium*, or lower lip, and four *maxillipedes* or 'foot-jaws.' The second pair of the latter organs possesses fangs for the discharge of a poisonous fluid. Each joint of the body bears but a single pair of legs, the last pair of limbs forming a kind of tail. The body is flattened, and the reproductive organs open at its hinder extremity. The C. is represented in Britain by small species, but those of tropical climates average 12 inches or more in length. Their bite is not necessarily fatal or dangerous, except in debilitated subjects. *S. gigantea, S. morsitans, S. cingulata*, &c., are familiar species. The genera *Lithobius* and *Geophilus* are also represented in Europe and elsewhere.


Centipede.

Centlivre, Susannah, a dramatic authoress, daughter of a Mr Freeman, was born in Ireland in 1678. Left an orphan, she went alone to London, where she married a nephew of Sir Stephen Fox. After the death of a second husband, poverty forced her into dramatic composition, in which she won decided success. Her third husband, Joseph Centlivre, was a cook to Queen Anne. She died in 1722. The best of her plays, *The Busy Body* and *A Bold Stroke for a Wife*, are sprightly and full of incident. See Ward's *Dramatic Literature*, vol. ii. C.'s plays were reprinted in 3 vols. in 1872.

Cen'to (Gr. *kentron*, Lat. *cento*, 'patchwork'), the name given to a certain trick of verse-manufacture popular in the decline of the Roman Empire, in which a medley was produced by putting together distinct passages of an author or of different authors in such a way as to present a new sense. The *Homerocentones* (Teucher, Leips. 1793) are specimens; also the *C. Nuptialis* of Ausonius, and the *C. Virgilianus* of Proba Falconia in the 4th c. Both of these Latin pieces of patchwork are misuses of Virgil's language, the latter resulting in an epitome of sacred history. This barbarism was a favourite pastime in the middle ages. A C. of spiritual hymns was made up by this perverse ingenuity from Virgil and Horace by a monk named Metillus in the 12th c.

Cento, a town of Central Italy, province of Ferrara, on the Reno, 18 miles S.W. of the city of Ferrara. It is celebrated as the birthplace of Guercino, the painter. Pop. about 5000.

Cen'tral Forces are forces which act to or from a fixed point. According to Newton's first law (see MOTION, LAWS OF), any body moving with a given velocity in a given direction will continue so to move, unless acted upon by some external force; and hence any change in the rate or direction of motion indicates the presence of such a force, which may or may not be central. If, however, as first proved by Newton, the body describe its otherwise than straight path, such that the straight line joining it with a certain fixed point sweeps over equal areas in equal times, that

point must be the centre of attraction or repulsion. The converse also holds true, being merely a particular case of the dynamical principle, that the Moment (q. v.) of the resultant of any number of forces with respect to any point, is equal to the sum of the moments of the components with respect to the same point. Another important property of all C. F. is that the change of kinetic energy (see ENERGY) of a mass in moving from one position to another under the action of such a force, is dependent only upon its initial and final positions, and not upon the form of the particular path described. Given the orbit of motion of a body, and the law of force can be easily deduced by a simple process of differentiation. The inverse problem, given the force to find the orbit, is much more difficult, and in some cases is soluble only by approximation.

When the force is attractive, there must obviously be another force generated so as to neutralise the attraction, otherwise the body would be dragged to the centre. This force, which is due to the constant tendency of the moving body to continue in a straight line, and which has no other effect than that mentioned above, has been erroneously called the *centrifugal* force, in contradistinction to the attractive or *centripetal* force. The amount of this so-called *centrifugal* force at any point of an orbit is found by dividing the square of the velocity of the body by the radius of curvature at that point, or $f = \frac{v^2}{\rho}$.

The first clear comprehension and rigorous mathematical treatment of C. F. are due without question to Sir Isaac Newton, who deduced from Kepler's second and third laws, combined with his own principles, the grand theory of universal gravitation, that *every particle of matter in the universe attracts every other particle with a force whose direction is that of the line joining the two, and whose magnitude is directly as the product of their masses, and inversely as the square of their distance from each other*; and this law contains within itself the complete statement of Kepler's three laws.

Cen'tralisation is a name for the process, sometimes forcible, sometimes fraudulent, but in modern history seldom natural, by which political power over several inferior communities is collected in one sovereign town or state. Absolute C. was aimed at in temporal matters by the Roman Empire; in spiritual matters it is still claimed as a right by the Vatican. As, however, the larger states of Europe are now in stable independence, so the papal claims, whether of jurisdiction, nomination of bishops, material contributions, or promulgation of dogma on faith and morals, are denied in Protestant countries, and recognised in Catholic countries only under constitutional checks. The C. which rose in Europe with the growth of municipalities and the decay of pure feudalism, consisted chiefly in the final recognition of sovereignty in matters of peace and war and other external politics (including the relation of the national church to the Pope), and in the establishment of a supreme court of justice. No doubt it was the sovereign who, by the grant of municipal charters, conferred not only rights of trade and local taxation, but also an independent local jurisdiction; but it was long before the C. implied in annual national subsidies, controlled by the voice of the nation in Parliament, appeared. These subsidies are now to a large extent returned in grants to particular localities, but are still mainly contributions to public and political objects. In Great Britain there is complete freedom in the election of the various county, municipal, and parochial authorities; and under Acts relating to the Poor Law, the Police, Education, Public Health, &c., these authorities have acquired powers of taxation and administration which ancient custom did not give them. These powers are exercised under the general control of Central Boards, but for the most part their interference is occasional, and is defined in narrow limits.

Cen'tre, in the geometry of curves and surfaces, is the point with respect to which the curve or surface is symmetrically disposed, and every straight line drawn through the C. will cut the curve or surface in points which, taken two and two, are equally distant from the C. In the case of a curve of odd degree, the C. must be a point of inflexion; in the case of one of even degree, however, it is not generally on the curve. This geometrical C., or C. of figure, often corresponds in position with the Centre of Inertia (q. v.).

Cen'tre of Gravity. If the attraction of a mass upon a rigid body be reducible to a single force, in a line passing through one point fixed relatively to the body, whatever its position may be with respect to the attracting mass, that point is its C. of G., and the body is a *centrobaric* body. Hence every centrobaric body attracts all external matter as if its own mass were collected in its C. of G., which centre coincides with the Centre of Inertia (q. v.), though differing essentially from the latter in its fundamental conception. If the centre of inertia should fall without the body, as in the case of a homogeneous ring, there can be *no C. of G.*, since it is a further property of this point that it must necessarily be *within* the body. For detailed discussion of centrobaric distributions, see Thomson and Tait's *Natural Philosophy*, vol. i. s. 526–535.

Centre of Gyra'tion of a rotating body, is that point at which, if the whole mass were collected, the moment of inertia with respect to the axis of rotation would remain unaltered. The circle described by this point is called the *Circle of Gyration*, and its radius k is obtained from the equation $k^2\Sigma m = \Sigma mr^2$, where r is the distance of an element m from the axis of rotation.

Centre of Inertia, commonly but inconveniently called the centre of gravity, is that point with respect to a system of material particles whose distance from any plane is equal to the sum of the products of each mass into its distance from the same plane, divided by the sum of the masses. Hence, taking as coordinate axes the intersections of three rectangular planes, the point is given by the equations—

$$x\Sigma m = \Sigma mx,\ y\Sigma m = \Sigma my,\ z\Sigma m = \Sigma mz.$$

In these the whole theory is contained. Thus, by simple differentiation with respect to *time*, the equations become $x\Sigma m = \Sigma m\dot{x}$, &c., from which we deduce that the sum of the momenta of the parts of the system in any direction is equal to the momentum in the same direction of a mass equal to the sum of the masses, moving with a velocity equal to the velocity of the C. of I. Another interesting property, for a simple demonstration of which see Thomson and Tait's *Elements of Natural Philosophy*, vol. i. s. 196–198, is that the sum of the products of each mass into the square of its distance for any point exceeds the corresponding quantity for the C. of I. by the product of the whole mass into the square of the distance of the point from the C. of I. *The moment of inertia* of a system about any axis is the sum of the products of each mass into the square of its distance from that axis; from which we have the interesting proposition that the moment of inertia of a system about any axis exceeds the moment of inertia about a parallel axis through the C. of I. by the moment of inertia about the first axis of the whole mass supposed condensed at the C. of I. The above theorems are easily applicable to the case of a *continuous* solid body instead of a system, by merely substituting integration (see CALCULUS) for simple summation.

Centre of Oscilla'tion is that point in an oscillating body at which, if the whole mass were collected, the single pendulum so formed would oscillate in the same time. Its distance from the point of suspension is found by dividing the moment of inertia of the body about the supporting axis by the product of the mass into the distance of the centre of inertia from the same axis. An important property, applied successfully by Captain Kater for finding the length of the second's pendulum at any place, is that the centres of suspension and oscillation may be interchanged without affecting the time of oscillation.

Centre of Percuss'ion is that point of a moving body at which the momentum may be supposed to be concentrated. For a body moving without rotation in a straight line, this point coincides with the centre of inertia, and for an oscillating body, with the centre of oscillation. Further, it is at this point that the moving body would strike the hardest blow upon any opposing obstacle; and if the obstacle were immovable, and the body perfectly rigid and inelastic, the collision would be followed by repose. Hence, if there be rotation, the C. of P. must be so situated that the collision may generate a rotation equal and opposite to that already existing.

Centre of Press'ure, or Met'acentre, is that point of a body immersed in a fluid at which the resultant pressure is applied. See HYDROSTATICS.

Centrif'ugal and Centrip'etal Forces. See CENTRAL FORCES.

Cephaëlis. See IPECACUANHA.

Cephalas'pis, a genus of extinct Ganoid fishes, forming the type of the family *Cephalaspidæ*, the members of which are distinguished by the possession of a peculiar bony, cephalic head-shield, or buckler, which has its angles produced into long processes, giving it much the shape of a 'saddler's knife.' The presence of this shield gave the generic name *Cephalaspis* ('buckler-headed') to the group. The shield was also prolonged in its hinder margin in the middle line. The orbits are set closely together, and exist nearly in the middle line of the shield. No jaws or teeth have been discovered, the mouth having probably been soft. The body was covered by ganoid scales, and a dorsal fin existed. The tail-fin was unequally lobed or *heterocercal*, and *pectoral* or breast fins existed. These fishes occur in the Silurian, but chiefly in the red-sandstone formations. As in most other *Ganoidei*, the skeleton was cartilaginous and of rudimentary nature. *C. Lyellii* is the most familiar species.

Cephalo'nia (anc. Gr. *Kephallenia*, Ital. *Cefalonia*), an island of Greece, and the largest of the Ionian group, has an area of 255 sq. miles, and a pop. (1870) of 77,382. It lies near the entrance to the Gulf of Patras, is only separated by a narrow strait from Ithaka, also called Little C., and has a much indented coast-line. The island, which is about 30 miles long and 10 broad, is traversed by a range of mountains, which attains in Mount Nero (anc. *Ænos*) a height of 5497 feet. There is a great scarcity of water, but even the high mountain terraces are made to yield grapes, or 'currants,' and olives. The climate is delicious; earthquakes, however, are not infrequent, the last severe shock being that of 1867. In 1874 the exports, chiefly currants and olive oil, amounted to £189,308, and the imports to £240,409. The population is composed mainly of Greeks, Italians, and Jews; and a Greek dialect is the spoken language. The capital is Argostoli. In the Homeric poems C. bears the name Same or Samos, and belongs to Ulysses. It in turn became the possession of the Athenians (431 B.C.), Romans (189 B.C.), Byzantines (395 A.D.), Venetians (1215), and Turks (1479–1502). Its later history is bound up with that of the Ionian Islands (q. v.).

Cephalop'oda ('head-footed'), the name given by Linnæus to the highest class of the Mollusca (q. v.), represented by the cuttlefishes,—including the famed paper-nautilus or *Argonaut*, the pearly nautilus, the poulpes, Calamaries (q. v.) or squids, &c. This class is readily known and defined as a group of higher mollusca, by the possession of a circle of arms or tentacles, borne on the head and surrounding the mouth; by the body being enclosed in a muscular Mantle (q. v.); by the effete water of respiration being ejected from an *infundibulum* or funnel placed on the front aspect of the body; by the breathing being carried on by two or four plume-like gills placed within the mantle-sac; and by the intestine having its first turn towards the *neural* or nervous aspect of the body. The head is distinct, and the mantle-sac or body is covered by a loose transparent skin or integument, beneath which colour cells or *chromatophora* are situated. By changing the position of these cells the C. can alter the hue of their bodies. The body may be provided with fin-like expansions of the mantle, as in the Calamary or Loligo (q. v.), in which the fins are terminal, or in *Sepia*, where a membraneous fin surrounds the body. The head with its circle of arms presents a singular appearance, and a glance at the figure of an ordinary cuttlefish will show that the name 'head-footed' has not been misapplied. The arms are modifications of the ordinary molluscan 'foot,' and in all cuttlefishes, save the pearly nautilus (*N. Pompilius*), are provided with rows of suckers, which may be sessile (as in *Octopoda*), or pedunculated or stalked (as in *Decapoda*). Each sucker consists of a cup-like structure provided with a firm rim and a muscular disc, by the contraction of which, by means of a little piston or papilla, a vacuum is produced, and the sucker is thus at once and firmly made to adhere to any surface. By pushing out the piston, the vacuum can be as readily destroyed, and the sucker released. The suckers are in some cases (*Onychoteuthis*) provided with hooked processes, or may be surrounded by a horny-toothed ring (as in decapods). Where ten arms exist (as in decapods like the calamary), two are elongated to form tentacles, the other eight arms being of equal and shorter length. Locomotion is effected in these animals by the arms and their suckers, the cuttlefishes thus walking head downwards; or they may propel themselves backwards through the water by aid of *jets d'eau* from the funnel, which consist of the water used in respiration; whilst they are capable of moving in other ways by means of their fins. The digestive system includes a mouth, horny jaws, gullet, crop, stomach, and intestine, liver, and salivary glands. An organ called the *ink-sac* is developed in all, save the pearly nautilus, and this structure secretes an inky fluid, which may be ejected from the funnel to darken the surrounding water, and so enable these animals to escape amid the obscurity thus produced. The heart consists of a *systematic* heart propelling pure blood through the body, and of a *branchial or gill heart* at the base of each gill to propel the venous blood into the gills for purification. Each gill is enclosed in a branchial cavity placed at the side of the body. Water is admitted by the front opening of the mantle, and ejected after being used in breathing, and—as already mentioned—by the 'funnel.' There are two gills in all cephalopods, except the pearly nautilus, in which four exist. The nervous system consists of a large cephalic or brain mass enclosed within a cartilaginous case, and from which nerves originate to supply all parts of the body. Large well-developed eyes and organs of hearing exist. The shell is internal, and exists in the form of a horny or limy pen (*gladius sepiostaire*, or *cuttlebone*) in most of these animals. In the paper-nautilus, an outside single-chambered shell (but not strictly agreeing with the true shells of other molluscs) exists; but in the pearly nautilus a perfect and true external shell is developed, and this latter is many-chambered. The sexes are distinct, and one of the arms of the males generally becomes modified to form a *hectocotylus*, which conveys the male generative elements to the female for the fertilisation of the eggs. These forms are classified as follows:—


Cephalopod.

ORDER 1. *Dibranchiata*—Two gills; arms, eight or ten, provided with suckers; ink-sac developed; shell internal, or if external, not chambered; funnel, a complete tube. Ex. Paper-nautilus or Argonaut, Octopods or Poulpes, Calamaries (*Loligo*), Sepia, Spirula, Eledone, Belemnites (extinct), &c.

ORDER 2. *Tetrabranchiata*—Gills, four; arms, numerous, not provided with suckers; no ink-sac; funnel, not a complete tube; shell, external and many-chambered. Ex. Pearly nautilus (only living example); fossil examples numerous, such as Ammonites (q. v.), Ceratites, Hamites, Goniatites, Turrilites, &c.

The C. are represented by numerous fossil examples: thus all the Tetrabranchiates are fossil and extinct, with the exception of the pearly nautilus. The several groups of this class are described under their respective headings (*e.g.*, Calamary, q. v.), and the stories of gigantic cuttlefishes, &c., are noted under the head of KRAKEN (q. v.).

Cephalop'tera ('head-winged'), a genus of Rays (q. v.) or *Elasmobranchiate* fishes, forming types of the family *Cephalopteridæ* or horned rays. Agreeing with the characters of the *Raiina* generally, they are distinguished by having the muzzle or head flanked on each side by a membraneous horn-like process, whilst the pectoral fins extend broadly outwards. The eyes are large, and are placed laterally. The tail is slender, and bears a long serrated spine. A small dorsal fin exists, and the teeth are numerous and of small size. *C. giorna* of the Mediterranean is the familiar species. The C. sometimes attain an enormous size. Risso mentions a male which weighed 800 lbs. and a female of 1200 lbs.

Cephalotax'us, a genus of Japanese and Chinese conifers, one of which, *C. Fortunei*, is now common in British collections of hardy trees and shrubs.

Ce'pheus, a constellation of the northern hemisphere, occupying the space between the stars Polaris and Deneb, but containing no star greater than the third magnitude.

Cepo'la. See BANDFISH.

Ceram', an island in the Indian Archipelago, one of the Moluccas, lies W. of New Guinea. Area 7000 sq. miles; pop.

said not to exceed 30,000. C. is mountainous, some of the elevations exceeding 10,000 feet. Maize is extensively cultivated, and there are large forests of the sago-palm. The Dutch assert the sovereignty, and the Malays, who trade under the Dutch flag, and supply the Chinese with sea-slugs, have several settlements on the coast. The natives (Alfures), negroes of the Papuan type, are mostly idolaters.

Ceram'byx, a genus of *Coleoptera* or beetles, founded by Linnæus, but not now much recognised in entomology. They possess long antennæ or feelers (*Longicornia*), and the British musk-beetle (*Callichroma moschata*) exemplifies the group. It is handsome, of a pure metallic green colour, and emits a strong musky odour. The larvæ live in timber and burrow in trees.

Ceramia'ceæ, a sub-order of *Algæ* (q. v.), very abundant in the Northern Seas. Dulse (q. v.), Carrageen (q. v.), Placaria (q. v.), and various other species are remarkable for their beauty or utility.

Ceram'ics (Gr. *keramos*, 'earthenware'). Under this name all varieties of the potter's art, from the rough-baked brickwork up to the finest productions in artistic porcelain, are included. The term is, however, usually restricted to the finer varieties of earthenware and porcelain, regarded as works of art.

Ceras'tes, a genus of *Viperine* snakes, represented by the horned viper (*Cerastes Hasselquisti* or *vulgaris*) of Egypt and N. Africa generally, where it is found in sandy or dry places. It is known by the presence of a horn-like process above each eye. The average length is about 15 inches or 1½ feet. The C. is very poisonous, and some authorities consider it to be the 'asp' of Cleopatra's tragic end. Other species (*C. nasicornis* and *caudalis*) belong to W. and S. Africa.

Cer'ate (Lat. *cera*, 'wax'), a medicine made with wax and fatty matter as a basis, and other substances as active ingredients. It resembles Ointment (q. v.).

Cer'atite, a genus of extinct *Tetrabranchiate* or four-gilled Cephalopoda (q. v.) or cuttlefishes, the discoidal shells of which occur as fossils chiefly in the Trias rocks. Some are found in the cretaceous rocks, but more occur in Jurassic strata. The genus is included in the family *Ammonitidæ* or Ammonites.

Cerato'nia, a genus of plants of the natural order *Leguminosæ* (sub-division *Cæsalpiniæ*), one of which (*C. Siliqua*) is the Carob Locust (q. v.). It is said that the seeds formed the original carat weight of the jewellers.

Ceratophylla'ceæ, the horn-weeds, an order of plants (division *Dicotyledons*, sub-division *Corolliflora*) comprising one genus (*Ceratophyllum*), containing one species (*C. demersum*), a common inhabitant of pools or slow streams in the northern hemisphere.

Cer'bera, a genus of trees belonging to the natural order *Apocynaceæ*, natives of tropical Asia. The seeds of most of them are poisonous. The bark of *C. Odollam*, of the Malabar coast, is purgative, and the unripe fruit is used to destroy dogs, the teeth of the animals being, it is reported, 'loosened so as to fall out after masticating it' (*Masters*).

Cer'berus (Gr. *Kerberos*), according to Hesiod, the fifty-headed dog that guarded the entrance to Hades. He is represented as the son of Typhon and Echidna. Later writers—*e.g.*, Sophocles—reduce his heads to three. By a poetic licence Horace calls him *Bellua centiceps*, 'the hundred-headed beast.'

Cerca'ria, the name applied to the larva or immature stage of certain parasitic *Entozoa* known as *Trematoda*, and represented by the 'flukes' (*Distoma*) and allied forms. A cercariform larva consists of a body possessing a tadpole-like tail, by which locomotion in the water is subserved. These *cercariæ* appear to be developed from a mother-cyst (*C. cyst*) or 'nurse,' produced in turn from the egg, or embryo, of the fluke, which has gained admittance to the breathing-chamber of such a form as the fresh-water snail. The C. thus liberated from the snail may swim about until it in turn may find a resting-place within the body of some aquatic insect-larva, or of a snail. Here it becomes encysted in its turn, and if it gain access to the sheep or other warm-blooded vertebrate, it becomes there developed into the adult *Distoma* or fluke. These flukes imbedded in the liver of sheep cause the 'rot' in that animal. See also FLUKE.

Cer'cis. See JUDAS-TREE.

Cercoce'bus, a genus of Catarhine (q. v.) monkeys, popularly, and together with the allied genus *Cercopithecus* (q. v.), known as 'Guenons.' The *C. fuliginosus*, or sooty mangabey, or negro monkey of W. Africa, is a good example of this genus, in which the tail is elongated.

Cercopithe'cus, a genus of Catarhine or Old-World monkeys, which with the genus *Cercocebus* (q. v.) includes those forms known as Guenons. These monkeys are typically African in their geographical distribution, and among the best-known species are the grivet (*C. Engythithia*), the vervet (*C. Pygerythrus*), the white-nosed monkey (*C. Petaurista*), and the Diana monkey (*C. Diana*). The tail in this genus is elongated, and cheek-pouches and nasal callosities exist.

Cerdo'cyon, a genus of *Canidæ* (q. v.) or dogs inhabiting S. America, and supposed to present features of structure intermediate between the dogs and foxes. The name *Aguara Fox* is occasionally applied to these animals, which may be domesticated, and trained to exhibit much intelligence.

Cere. See BILL.

Cere'a, an old town in the province of Verona, N. Italy, 19 miles S.S.E. of Verona, has a ruined castle, and was the scene of a victory gained by the Austrians over the French in 1798. Pop. 5930.

Cerea'lia, or **Cereal Grasses**, another name for the corn or bread plants—though the name is generally reserved for those that belong to the order of grasses, such as wheat, barley, rye, oats, rice, maize or Indian-corn, millet, Durra or Guinea corn, &c., all of which have been cultivated for so long that it is difficult to say what the origin of any of them is. There are also a number of other grasses cultivated for the sake of their seeds, but these are not usually spoken of as cereals, and their origin is known. Among these may be ranked *Elusine* (Mand) of India, Teff (*Poa*) of Abyssinia, *Zizania*, Canadian Rice (q. v.), &c., and a variety of other plants, from the ground seeds of which bread is made, such as buckwheat, &c. Spirituous and fermented liquors can be made from most of them.

Cerebell'um. This organ is sometimes termed the lesser or hinder brain. It is situated in the posterior fossa of the skull. In many of the lower animals it is not completely overlapped by the posterior lobes of the cerebrum or greater brain, but in the higher quadrumana or apes, and in man, it is completely concealed by the cerebrum when the brain is placed on a flat surface, and the eye is directed to the vertex.

Anatomy.—The C. consists of a body, and of three peduncles or bands by which it is connected with adjoining parts of the nervous system. Superiorly it is connected to the cerebrum, and inferiorly to the *medulla oblongata*, and through it with the spinal cord. The body consists of two lateral hemispheres, having between them a mass of nervous matter termed the vermiform process. The two lateral hemispheres are connected together by the middle peduncles or bands, which pass from one side to the other, forming the transverse fibres of a structure called the *Pons Varolii*. The surface of the C. presents convolutions to which special names have been given, which may be found in every work on anatomy.

Minute Structure of the C.—When a section is made through the organ, it is found to consist of grey and of white matter, so arranged in leaflets as to present a peculiar arborescent appearance, which has been called by the older anatomists, the *arbor vitæ*. The surface of the lobes of the C. consists of leaflets. Each leaflet has white matter internally, and grey matter externally. When a portion of C. is hardened, so that a thin section may be made, stained, and mounted, according to the methods of modern histology, a leaflet is found to consist of three layers, arranged as follows:—Most internally, a layer of nerve-fibres; outside of this a broad layer of granules or cells closely placed together; while most externally, and next the surface, there is a finely molecular layer. At the junction of the molecular with the granular layer, there is found a single row of large nerve-cells, termed the *cells of Purkinje*, after their discoverer. These cells are shaped somewhat like a tadpole, the head being directed to the granular layer, while the tail, which splits up into many delicate fibres, passes outwards and is lost in the molecular layer. According to certain histologists,

there are fibres connecting the granules of the granular layer with Purkinje's cells, but these have not yet been satisfactorily demonstrated. In the centre of the body of the C. there is a nucleus of grey matter, known, on account of its corrugated or toothed appearance, as the *corpus dentatum*.

Physiology.—No part of the nervous system is more obscure as regards its function than the C. Disease of the organ is rare. When it does occur, the most common symptoms are blindness or indistinctness of vision, unsteadiness of gait, and a tendency to fall backwards. The mental faculties are not affected. Experimental inquiry shows that when the organ is injured or partially removed, the animal does not lose consciousness, nor is it paralysed, but it appears to have lost the power of directing or of controlling its movements. It moves its feet in an irregular manner, and is unable to perform any action requiring careful adaptation of motions. Intelligence and sensation are unaffected. From these pathological and experimental data the following theories have been put forward regarding the functions of the C. :—

1. That it is somehow [illegible]. The exact connection of the C. with [illegible] unknown.

2. That it is the co-ordinator of muscular movements. In grasping any small object, such as a pen, delicate adjustments of the various groups of muscles are required. It has been supposed that the C. effects this, but no one knows how.

3. That it is the seat of the muscular sense. This is the sense by which the mind becomes cognisant of the position of any limb and of the degree of contraction of the muscles. It is through it we have a feeling of weight or resistance, and it gives the information on which the mind acts in determining further movements. It has been supposed that when the C. is diseased or injured there is no guiding sensation on which the mind can act with definiteness, and hence the movements that follow volition are vague and purposeless.

4. Some phrenologists assert that the C. is the seat of the sexual instincts. This view is not generally adopted by physiologists. It has not been found that there is any distinct relation between the size of the C. and the development of sexual passion, while other facts directly militate against this view. Thus the C. is not smaller in animals which have suffered castration.

The preponderance of evidence is in favour of the view that the C. is connected with the co-ordination of the muscular movements, but the exact method by which it effects this is unknown.

Cer'ebric Acid. This is a fatty acid contained in the brain, and obtained by a complicated process (see Watts' *Dict of Chem.*, vol i. p. 820). It is a white, granular crystalline substance, soluble in boiling alcohol, insoluble in water. Ultimate analysis by Frémy showed that it contained 66·7 per cent of carbon, 10·6 of hydrogen, 2·3 of nitrogen, 0·9 of phosphorus, and 19·5 of oxygen. The acid forms salts with nearly all bases. It is doubtful whether it forms a constituent of brain-tissue as C. A.

Cer'ebrin. This name is given to matters extracted from brain-matter by means of alcohol. They probably consist of a mixture of cerebric acid and phosphuretted fats. Preparations of brain which have been long immersed in alcohol sometimes yield crystals of cholestrin.

Cer'ebrol. This has been described as an oily substance, of a reddish colour, obtained by the action of alcohol and ether on brain-matter. It is probably composed of oleo-phosphoric and cerebric acids and cholestrin.

Cer'ebro-Spi'nal Axis. This term is usually applied to the central part of the nervous system, as distinguished from the nerves or peripheral part. The C.-S. A. consists of the brain and spinal cord. The brain is contained in the cavity of the cranium, and the spinal cord or marrow in the bony canal formed by the vertebræ. Both structures are surrounded by three membranes as follows :—*1st*, and most externally, a strong fibrous membrane termed the *dura mater*; *2d*, and in the middle, a serous membrane called the *arachnoid*; and *3d*, and directly covering the brain and cord, a vascular membrane named the *pia mater*. The C.-S. A. consists of a right and left half, exactly symmetrical, which are united together by commissures or connecting masses of white or grey matter. The spinal portion of the C.-S. A. is well developed in all vertebrate animals, but the cranial portion in the skull presents many degrees of development in different genera, from the imperfect condition of the *Amphioxus lanceolatus* to the highly complex cerebrum of man. See BRAIN, CEREBELLUM, CEREBRUM, SPINAL CORD, &c.

Cer'ebro-Spinal Fluid. This fluid is found bathing the surface of the brain and spinal cord underneath the sac of the arachnoid membrane. It has been obtained for purposes of analysis from a case of *spina bifida*, a congenital condition in which a portion of the posterior wall of the vertebral canal is deficient. The analysis of 1000 parts by Hoppe-Seyler and Schwaberg was as follows :—

	Percentage Composition.
Water	989·33
Solid matter	10·67
The solid matter was—	
Albumen	0·25
Extractive matter	2·30
Soluble salts	7·67
Insoluble salts	0·45

Cer'ebrote. Alcoholic extracts of brain-substance yield a deposit; this deposit treated with ether is C. It is no doubt a complex substance, similar in nature to cerebrol and cerebrin.

Cer'ebrum. The C., or greater brain, forms the largest division of the nervous mass in the skull. It gradually increases in size and complexity of structure as we ascend from the lower to the higher groups of vertebrate animals, and it attains its maximum size in man. The human brain is absolutely larger than the brain of any animal, except the elephant and the larger whales; and it is larger, relatively to the size of the body, than in any other animal, except in certain small birds and mammals. The average weight of a well developed brain of a European is 49 to 50 oz. in the male, and 44 to 45 oz. in the female. The brains of many highly intellectual men have been found to exceed the average size. The following are examples :—Cuvier, 64½ oz.; Dr Abercrombie, 63 oz.; Goodsir, 57 oz.; Spurgheim, 55 oz.; Sir James Y. Simpson, 54 oz., and Dr Thomas Chalmers, 53 oz. The brain may, however, be heavier than usual in the insane. Thus the records of the West Riding Asylum show that out of 375 males examined, in thirty cases the brain weighed over 55 oz.; while in 300 females, in twenty cases the weight was 50 oz. or upwards. Thus it appears that, beyond a certain limit, there is no necessary relation between weight of brain and degree of intellectual power. On the other hand, it has been ascertained that an individual having a brain weighing less than 30 oz. is invariably an idiot. Some idiots have a brain weighing only 10 or 12 oz.; but idiocy may also be associated with a brain weighing from 45 to 50 oz. The inference, therefore, is that quality as well as quantity of brain is essential to intellectual vigour. Little is known definitely regarding the weight of the brains of uncivilised races, but the few records made show conclusively the average brain-weight is lower in savage races than in the European.

In considering the C. we shall describe—(1) general anatomy, (2) minute structure, (3) physiology.

1. *General Anatomy*.—The C. is an oval mass consisting of two hemispheres, separated from each other by a deep fissure, which runs from before backwards in the median line. The hemispheres are united by a broad band of fibres passing transversely, called the *corpus callosum*. Each hemisphere is convex on its upper surface, and flattened underneath. The upper surface presents a peculiarly folded appearance, forming the convolutions of the C. The furrows or *sulci* between these are generally from half an inch to an inch in depth. These convolutions have received special names, which will be found in any standard work on anatomy (see Quain's *Anatomy*, 7th ed. Lond. 1867). Their outer surface is adapted to the inner table of the bones forming the vault of the cranium. Convolutions are also found on the lateral and inferior aspects of the brain mass.

When the base of the brain is examined, it presents an irregular mass, from the under surface of which the cranial nerves issue to be distributed to the organs of sense, the face, and structures in the neck, chest, and abdominal cavity. Posteriorly, there is the under surface of the *cerebellum* and the *medulla oblongata*, while in front of the latter, the *pons varoli* is seen passing transversely. Emerging from the fore part of the *pons*, and separating from each other as they pass upwards and outwards, are two bands of white matter, called the *peduncles* or *crura* of the C. Each of

these is crossed by a flattened band named the *optic tract.* The two optic tracts converge to form one mass, the *optic commissure,* from the fore part of which the optic nerves issue.

The interior of the C. may be examined by making transverse sections from above downwards. This was the method pursued by the older anatomists, who gave fanciful names to the various parts thus displayed, which render the subject singularly difficult to the modern student. When a horizontal section is thus made a little above the level of the *corpus callosum,* it is seen that the central mass of the C. is composed of white matter—that is, of nerve-fibres, while the margins are covered by a layer of grey matter, consisting of nerve-cells, connective tissue, &c. When the section is cut as low as the *corpus callosum,* it will be seen that the white matter of this structure passes into the hemisphere on each side. If the fibres of the *corpus callosum* are now divided longitudinally a short distance on each side of the median line, two cavities in the interior of the C. are opened, named the *lateral ventricles.* These cavities are lined by a serous membrane, which secretes a thin fluid, and they are connected with similar cavities in the brain.

There are certain special structures to be briefly alluded to, because they are usually included by anatomists and physiologists in what is known as the C.

Corpora Striata.—These are two large masses of nervous matter seen in the floor of the lateral ventricles.

Optic Thalami.—These are two masses, composed chiefly of grey matter, seen in the lateral ventricles, and forming the outer walls of the third ventricle. They are in intimate connection with the cerebral peduncles.

Corpora Quadrigemina.—These are four bodies composed of nervous matter placed above a foramen which leads from the third to the fourth ventricle. The latter ventricle is the space between the posterior aspect of the *medulla oblongata* and the cerebellum.

Pineal Gland.—This is a small red body found in front of the *corpora quadrigemina.* It is not a nervous organ, although the ancients believed it to be the seat of the soul, but it in all probability belongs to the group of glands known as the Bloody Glands (q. v.).

2. *Minute Structure.*—The C. is composed of white and of grey matter. The white matter consists of nerve-fibres, and the grey matter of nerve-cells and delicate nerve-fibres embedded in a very fine variety of connective tissue known as *neuroglia.* The grey matter is distributed over the surface of the convolutions, and is also collected in masses in the interior of various parts. These local masses are usually termed *nuclei.* When examined in the fresh condition, the cerebral matter is so soft and pulpy that little can be learnt regarding its minute structure. If it is hardened, cut, stained, and mounted in a proper manner, the structure can be studied with ease. (See MICROSCOPICAL MANIPULATION.) When a vertical section is made through a cerebral convolution, and examined under a power of thirty diameters, it is seen that there are no fewer than six layers of white and grey matter alternating with each other. There is, however, no distinct line of demarcation between the various layers. They glide gradually into each other. When seen under a magnifying power of 250 or 300 diameters, the surface of the convolution presents a molecular appearance. Here and there are minute vessels which pass into the brain from the *pia mater.* The remainder of the structure is composed of *neuroglia.* Deeper in the substance of the convolution two kinds of nerve-cells are found: (1) small round cells about $\frac{1}{2000}$ of an inch in diameter, similar to those found in the middle or rusty layer of the Cerebellum (q. v.); and (2) larger cells of a pyramidal shape, having the apex directed towards the surface of the brain. Each of these cells has at least three processes (sometimes four), by means of which they are connected together, and by which they unite with nerve-fibres which may ramify through the body. In addition to these nerve-cells there are numerous delicate nerve-fibres ramifying in various directions. Many of these pass longitudinally, forming a commissural system which connects one convolution with another. Still deeper in the substance of the brain modern investigation has shown the existence of large multipolar cells, that is, cells having five or more processes, somewhat similar to those found in the spinal cord.

Grey matter in the form of *nuclei* has also been found in the *corpora striata, optic thalami,* and *corpora quadrigemina,* but the exact connection of these with other parts has not been satisfactorily demonstrated.

3. *Physiology.*—The C. is the part of the brain more immediately connected with all mental acts, including intellect, will, emotion or feeling, and sensation. It is also the part associated with the power of voluntary motion. That these functions are dependent on the integrity of the grey matter on the surface of the brain is proved by the following considerations:—(1) In the animal kingdom generally a correspondence is observed between the quantity of grey matter and the sagacity of the animal. (2) At birth the grey matter of the C. is thin, so much so that the convolutions are marked out only by shallow fissures, which afterwards become the *sulci* by development of the grey matter *pari passu* with the growth of intelligence. (3) Experimental research proves that on slicing away the grey matter from the surface of the brain, the animal loses all the phenomena of mind, and becomes dull and stupid in proportion to the quantity of cortical substance removed. (4) Observation of diseases of the brain at the bedside shows that in those cases in which the disease has been afterwards found to commence at the circumference of the brain, and proceed towards the centre, the mental faculties are affected *first;* whereas in those diseases which commence at the central parts of the organ, and proceed towards the circumference, they are affected *last.*

The function of the *white* matter of the brain is to conduct nervous impressions in various directions. Disease of the white matter, such as destruction by a clot of blood, as in Apoplexy (q. v.), is followed by paralysis, either of motion or of sensibility, according as motor or sensory nerves are affected.

The deeper nuclei in the *corpora striata, optic thalami,* &c., have no doubt special functions, though these have not yet been accurately determined.

Corpora Striata.—These bodies are generally believed to be connected with motion. Destruction of even a small portion, from any cause, produces paralysis on the opposite side of the body. (See HEMIPLEGIA.) This is owing to the fact that the motor fibres, which pass down from these bodies to the spinal cord, from thence to be distributed to various muscles, decussate or cross over to the other side in the *medulla oblongata.* (See MEDULLA OBLONGATA.) Disease limited to the convolutions, and not affecting the *corpora striata,* is not attended by paralysis, but causes insanity.

The *Optic Thalami* are connected with sensation, that is, they receive sensory impressions from various parts of the body which they transmit to the cerebral hemispheres. Disease of these structures causes either perversion or loss of sensibility in various parts of the body, sometimes on the same side as the lesion, but usually on the opposite.

The *Corpora Quadrigemina* are undoubtedly connected with vision. They are the homologues of the optic lobes of birds. They attain a great size in birds, but are much smaller in mammals. Disease of the *corpora quadrigemina* is followed by loss of vision, with complete dilatation of the pupil of the eye. Brown-Séquard found that, puncturing these bodies on the left side, the right eye was convulsed while the other was normal. After the injury, also, the animal walked round and round in a circle, after the manner of a horse in a circus, that is, it appeared to be impelled by an irresistible force to move in one circular direction.

Recent Researches.—The method of research by vivisection is open to many objections, the chief of which is, that the severity of the operation and the loss of blood may cause such a state of shock as to vitiate any inferences that might be drawn from the facts recorded. A new method, however, has been devised, namely, that of stimulating the nervous centres by electricity, and observing the results. Until recently it has been accepted by all physiological authorities that the cerebral hemispheres are destitute of irritability. It was apparently shown by Longet, Majendie, Matteucci, Weber, Budge, Schiff, and others, that irritation of the surface of the hemispheres called forth no muscular movements. It was consequently concluded that the cerebral convolutions over their entire extent were associated with the phenomena of the mind. The method of irritating the surface of the brain with a weak galvanic current was pursued in Germany by Fritsch and Hitzig conjointly, and in England by Ferrier.

The commencement of this method of inquiry dates from an observation made by Hitzig on a wounded soldier during the Franco-Prussian war, that galvanic irritation of a portion of the cerebral hemispheres excited contractions of the muscles of the

orbit. Experiments on the lower animals were begun by Hitzig and Fritsch when peace was restored. The method was very simple. A portion of the *calvarium* was removed from dogs, the sensitive *dura mater* was split up and carefully removed from the surface of the convolutions, and areas on these were then irritated by a weak continuous current. The result of these inquiries may be briefly stated as follows:—1. In the anterior portions of the surface of the hemispheres there are certain definite regions irritation of which causes muscular movements on the opposite side of the body. 2. Irritation of the posterior lobes produce no muscular movements.

Dr Ferrier's researches were made in the first instance in the pathological laboratory of the West Riding Asylum, and afterwards in the laboratory of the Brown Institution, London. Dr Ferrier has experimented on pigeons, fowls, guinea-pigs, rabbits, jackals, and monkeys. The method of experiment is that already described as the one pursued by Fritsch and Hitzig. The irritating current was derived from the secondary coil of Du Bois-Reymond's induction machine, the primary coil of which was in connection with one Stöhrer's cell (with carbon and zinc elements). By moving the secondary coil in the sliding board, and thus increasing or diminishing the distance from the primary coil, the strength of the current may be carefully graduated. Dr Ferrier has observed the following phenomena:—1. Stimulation of the surface of the hemispheres causes a determination of blood to the part stimulated. 2. Stimulation of areas on the surface of the anterior lobes of the hemispheres causes muscular movements on the opposite side of the body. 3. Long-continued Faradisation causes convulsions of an epileptiform character. The convulsions were always preceded by 'an excited hyperæmic condition of the cortical matter of the hemispheres.' 4. As regards the presence of motor centres in the C., the two sides of the brain are completely symmetrical. 5. Irritation of the posterior lobes is not followed by muscular movements. 6. In certain animals the centres for special movements are more differentiated than in other animals, in a manner corresponding to the habits of the animal. Thus, the centres for the lips of the rabbit, the tail of the dog, and the paw of the cat are highly differentiated. Various other methods of experimentation recently employed support the view that in the anterior lobes of the cerebral hemispheres there are centres connected with voluntary movements, and that these centres are distinct from each other. These facts so far are in support of the doctrine long ago put forth by Gall and Spurzheim, the founders of phrenology, that the brain is a compound organ, having parts connected with special faculties. (See PHRENOLOGY.) These researches have also important bearings on the diagnosis and treatment of many diseases of the brain. See EPILEPSY, INSANITY, CHOREA, HEMIPLEGIA, PARAPLEGIA.

Cereop'sis ('wax-face'), a genus of natatorial birds, nearly allied to the *Anserinæ* or geese, and of which the *C. Novæ Hollandiæ*, of New Holland, is a familiar example. These birds have the front of the head covered with a yellow skin. The legs are longer than in ordinary geese, and the extremities of the tibiæ or shins are invested by a naked skin.

Ce'res, the name under which the Romans worshipped the *Dêmêtêr* of the Greeks. According to the Greek myth, she was the daughter of *Kronos* and *Rhea*, and the mother of Proserpina, Cora or Persephonê, whose rape by 'gloomy Dis' (Aïdoneus or Pluto) forms the chief incident by which C. is individually known. She wandered in human form in search of her daughter, and deprived the earth of its fertility till Zeus was compelled to send Hermes to Erebus to bring back the maiden. Aïdoneus allowed her to return on the condition that Proserpina should spend the winter in Erebus, while the rest of the year should be spent with her mother. It is difficult to believe that the myth is not symbolic of the apparent concealment of natural life in the under world during the gloom of winter, and its joyous reappearance in the spring. The analysis of the names favours this view. The Greek myth has its counterpart in some measure in the tales told by the Norsemen of the Niflungs. As the all-nourishing Earth-mother, C. is the inventress of agriculture, the ameliorator of life, the creator of the feeling of patriotism, and of a regard for law and order, whence she was called *Thesmophoros*. C.'s worship was established at Eleusis, but soon extended over Attica, the Peloponnesus, the Isles of the Ægean, the coasts of Asia Minor and Sicily, whence it passed to Rome. (See ELEUSINIA.) From the colour of the ripened grain, she was known as the yellow goddess, and from the bounties of the harvest-time, as the mother of riches. The sacrifices offered to her consisted of pigs (the symbol of fertility), cows, honey-cakes, and fruits. In works of art she is represented with a long robe, a wreath of poppies or corn-ears, and carrying a sickle or a torch. Her feast at Rome (*Cerealia*) was celebrated on the 13th, or, according to others, on the 7th of April.

Ceres, the first-discovered of the Asteroids (q. v.), observed by Piazzi of Palermo on January 1, 1801. It is very small, appearing as a star of the seventh magnitude, and having a diameter variously estimated from 160 to 1600 miles.

Ce'reus, a genus of plants of the natural order *Cactaceæ*. There are in all about 100 species, many of them producing magnificent flowers. Some, like *C. speciosissimus* of Mexico, are common in our conservatories. *C. giganteus*, the Suwarrow or Saguaro of Mexico, will reach a height of 50 or 60 feet. The fruit is eaten. (See CACTACEÆ) *C. Macdonaldiæ* is a native of Honduras, and *C. grandiflorus*, the night-flowering C., is another well-known species of the W. Indies.

Cerigno'la, La, a town in the province of Foggia, S. Italy, 25 miles S.E. of Foggia, stands on rising ground, and has an active trade in almonds, and extensive cotton manufactures. Pop. of commune, 21,639. Here, on the 28th April 1503, the Spaniards, under Duke Gonsalvo of Cordova, achieved supremacy in Naples by a victory gained over the French, led by the Duke of Nemours, who was killed. In the vicinity of C., on the W. shore of Lake Salpi, are the ruins of the Apulian town of *Salapia*, which was destroyed by the Romans during the great Punic War.

Cer'igo (anc. *Cythêra*), the most southern of the Ionian Islands, lies to the S. of the Morea, and is a heptarchy in the nomarchy of Argolis and Corinth. Area, 107 sq. miles; pop. (1864) 14,454. It is in general mountainous and barren, but some of the valleys produce grain, vines, and olives, and other southern fruits. The honey of the island is celebrated, and so are the fish of its shores, in which a large trade is carried on. The capital, Kapsali, has a pop. of 1500. Near San Nikolo, where there is safe anchorage, are some ruins, supposed to mark the site of the ancient city of Cythera, where Venus had a splendid temple, and from which she took the name of Cytherean.

Cerin'thus was a heresiarch of Jewish extraction in the 1st c., whose system was a mixture of Judaism and Gnosticism, and against whose errors the Gospel of John is supposed to have been written. His esoteric doctrine being chiefly founded on the Cabala, he was the precursor of the Ebionites, and also of the Gnostics. His Judaism amounted to this, that circumcision and the ceremonial law were still binding on Christians. Regarding Christ, C. held with Basilides that the Logos (Christ) descended on the man Jesus at his baptism. In his system Millennarianism (q. v.) also first appears, and that of a very gross description, the delights of the millennium being to consist chiefly in carnal gratifications. See Paulus' *Historia C.* (Jena, 1779), and Neander's *Kirchengeschichte*.

Cerith'ium, a genus of *Gasteropodous* molluscs, representing the family *Cerithiadæ*, which in turn is included in the *Prosobranchiate* division of the above class. The genus *Cerithium* (of which *C. adversum*, *C. reticulatum*, and *C. metula* are familiar species) possesses a long, spiral, tapering shell, the aperture being small, and its canal tortuous. The outer lip is expanded, the inner lip thickened, and the operculum is horny and spiral. Many fossil species are known.

Ce'rium is a rare metal contained in the minerals *Gadolinite*, *Cerite*, and *Cryptolite*, and was named after the planet Ceres. It was discovered in 1803 by Klaproth, and by Hisinger and Berzelius. Oxalate of C. has been used medicinally in cases of pyrosis and obstinate vomiting. C. is usually accompanied in its ores by two other metals, called *Lanthanum* and *Didymium*, possessing much the same properties, and separable from it with difficulty.

Cerope'gia, a genus of herbaceous plants and shrubs, comprising about fifty species, natives of India and Africa, belonging to the natural order *Asclepiadaceæ*. Several species are eaten either as a salad, or the leaves, stems, and tubers are boiled as potherbs.

Ceroxʹylon. See WAX-PALM.

Cerreʹto, a town of S. Italy, province of Benevento, 22 miles N.E. of Capua, on the slope of Mount Matese, has a cathedral and manufactures of coarse cloth. Good wine is produced in the neighbourhood. C. was partly destroyed by an earthquake in 1688. Pop. 6469.

Cerrʹo de Pasco, a mining city of Peru, the capital of the province of Pasco, department of Junin, 140 miles N.E. of Lima, and 14,100 feet above the level of the sea. The pop., a mixture of all races and nationalities, fluctuates with the state of the mines, being sometimes as high as 14,000, and sometimes much less. The silver-mines, discovered by an Indian in 1630, are the richest in the republic, and coal is found in the vicinity.

Certalʹdo, a town of Central Italy, province of Florence, on the right bank of the Elsa, and 18 miles S.W. of Florence, with which it is connected by railway. Boccaccio at one time resided at C., and here he died. His house still exists, and contains some memorials of the great author. On the 21st December 1875, exactly 500 years after his death, a solemn commemoration was here held in his honour, and the first stone of a monument to his memory was laid in the Piazza Solferino. Pop. 6562.

Certhiʹdæ, a family of Tenuirostral *Insessores* or perching-birds, popularly known as that of the 'Creepers.' These birds are distinguished chiefly by their negative characters. The bill is elongated and slender, the nostrils opening at its base; the legs are usually short, and the toes are long, and provided with long sharp claws. The song is generally melodious. The name 'creepers' indicates the habits of these birds in running swiftly about trees in search of insects, which form their chief food. They are for the most part of small size. Examples of the group are seen in the wrens, lyre-birds, nuthatches, true creepers (*Certhinæ*), tree-creepers, oven-birds, &c.

Certifʹicate, as a legal term, has nearly the same meaning as in ordinary language.

Certificaʹtion, in Scotch law, signifies properly the *assurance* given to any one before the court of the course which it will follow in case of disobedience to the summons or other order of the court. C. is either expressed or implied. In the summons, the C. is nothing more than an absolute assurance to the defender that, if he fails to appear in the usual manner, the judge will decree in his absence. The most important C., however, is that in the process of Reduction-Improbation (q. v.). In that action, two terms are allowed to the defender for production of the writ sought to be reduced, and after the expiration of these terms ten days longer are allowed, but should the writ not then be produced, decree of C. may be pronounced by the judge, the effect of which is to hold the writ false and fabricated; and this decree can hardly be recalled, even though it has been pronounced in absence.

Cerʹtified Copy. See EVIDENCE.

Certioraʹri, in English law, is an original writ issuing out of Chancery, the Queen's Bench, or other divisions of the Supreme Court, directed in the Queen's name to the judges or officers of inferior courts, commanding them to return the record of a cause or matter depending before them, to the end that the party may have the more sure and speedy justice before Her Majesty, or such justices as she shall assign to determine the cause. This writ can only be granted on matters of law, and cannot be had to remove causes after issue is joined.

Certoʹsa di Paʹvia, La, a celebrated Carthusian monastery in the neighbourhood of Pavia, founded in 1396 by Giovanni Galeazzo Visconti, first Duke of Milan, as an expiatory offering for the murder of his uncle. The church is a splendid building; some of its twelve interior chapels are finely decorated with frescoes and paintings. Its façade, designed by Ambrogio Borgognone (da Fossano) in 1473, is a gorgeous specimen of the Early Renaissance. It is formed throughout of white marble, and so lavishly adorned with sculptures that the architectural design is almost hidden. In the interior there are several handsome monuments; but the most striking objects are the magnificent high altar and the monumental tomb of the founder.

Ceruʹmen. This is a yellow secretion yielded by a variety of sebaceous glands (see SKIN) found in the skin lining the canal of the external ear. (See EAR.) It has a bitter taste, and appears to consist of a mixture of oily and nitrogenous matter. It also contains carbonate of soda and phosphate of lime. Its bitter taste may possibly prevent the entrance of insects into the external ear. When in excessive quantity it is known as *ear-wax*. Occasionally it must be removed by gentle syringing with tepid soap and water, as an excessive amount causes partial deafness.

Cervanʹtes, Saaveʹdra, Miguel de, author of *Don Quixote*, was born at Alcala de Henares, October 9, 1547. After studying at Salamanca and Madrid, and devoting himself particularly to poetry and romance, at the age of twenty-three he served as a volunteer against the Turks, and had his left hand maimed by a gunshot wound at the battle of Lepanto. To this accident coarse and cruel reference was subsequently made by the so-called Avellaneda in the prologue to his continuation of *Don Quixote*. C., captured by Algerine pirates, was a slave among the infidels for four years; but being ransomed in 1580, he rejoined the army, and acquired fresh distinction in the expedition to the Azores. He retired from military service in 1584, and in the same year published his *Galatea*, a pastoral romance. For several years after this he was a prolific dramatic writer, and experienced the fate then attending too many writers of this class, that, namely, of chronic poverty. In 1605 appeared at Madrid the first part of his *Don Quixote*, one of the highest efforts of imaginative genius which universal literature can boast of. The work is a satire, but is informed with the finest spirit of poetry. Its object was not, as many suppose, to ridicule knight-errantry, for that had expired a century before his birth, but the absurd romances written about it, the morbid appetite for which had become a national weakness, and was growing by what it constantly fed on. Like all works of the highest genius, it was replete, in the midst of its extravagances, with the most genuine human interest: its inner object being to show that the finer a nature is—the deeper, truer, purer, less selfish—in the same proportion will it be the butt of a coarse and selfish world. It presents us with a touching picture of the efforts of a pure but unpractical spirit to ameliorate the conditions of human life. The success of the work was complete; nor was it confined to Spain. But increased fame did not bring with it increased fortune. The proverbial poverty of authors still clung to C., though in the meantime he laboured hard at his vocation. In 1614 appeared a continuation of *Don Quixote* by an author under the assumed name of Alonzo Fernandez de Avellaneda. It was a poor travesty of the realistic portion of the work of C., of whom it was full of the bitterest abuse. C. felt this keenly, as may be gathered from several portions, especially the preface, of his own second part of *Don Quixote*, published in 1615. He represents the work of Avellaneda as being kicked up and down hell by devils, one of whom says, 'It is so bad, that if I myself wished to make it worse I should not succeed.' For some time before his death, which happened at Madrid, April 23, 1616 (the day on which Shakespeare died), his poverty had been relieved by the generosity of the Count of Lemos. His grave is unmarked by a stone, but the house in which he lived in Madrid was rebuilt in 1835, and attention is called to it by his bust, which adorns its front. It has been said that 'except, perhaps, the Bible, no book is so much and so little known.' Innumerable translations of it have been published. It has lately been translated into Norwegian, and copies in fifty languages are to be shown in the Exhibition at Philadelphia (1876). But from an ignorance of the language and of the allusions, most translations are defective; and Spanish scholars say that the English versions of Skelton, Smollett, Jarvis, and even of Clark, are extremely untrustworthy, most of them being merely renderings of imperfect French versions. That of Clark (Lond. 1868–69), however, is illustrated by Doré's splendid plates. An *edition de luxe* of a translation into Portuguese by the Viscount de Castillo, with Doré's illustrations, is to be issued by the Campanhia Litteraria of Oporto. One of the best known and happiest of the imitations of *Don Quixote* is Butler's *Hudibras*. Among the editions of the original it is sufficient to mention that of Madrid, 4 vols. 1780; that of the Madrid Academy, with a biography of C. by Navarette (5 vols. Mad. 1819); and Clemencin's edition, with an admirable commentary

(6 vols. Mad. 1833–39). C.'s collected works are contained in Baudry's *Collection de los Mejores Autores Españoles* (Par. 1840–41).

Cerve'ra, a town of Spain, province of Lerida, 31 miles E. of the city of Lerida, surrounded by dilapidated walls. Its university, transferred by Philip V. from Lerida in 1717, was removed to Barcelona in 1837–41, and since then the prosperity of the town has greatly declined. C. has a Gothic church and a Dominican convent; linen, woollen, hempen, and cotton, manufactures; and some trade in grain and cattle. Pop. 5300.

Cervet'ere', or **Cervet'ri** (the ancient *Cære*, called by the Greeks *Agylla*), a village of Latium, Central Italy, 27 miles W. by N. of Rome. Pop. 750. It was formerly one of the most powerful cities of S. Etruria, and many interesting Etruscan remains have been found here, especially in its sepulchres.

Cer'via, an episcopal city of Italy, province of Ravenna, on the Adriatic, 13 miles S.S.E. of Ravenna. In the *Valle di C.* are productive saltworks, which give employment to a large number of the population, estimated at from 5000 to 6000.

Cervidæ and **Cervus**. See DEER.

Cer'vin, Mont. See MATTERHORN.

Cervina'ra, a town of Italy, province of Avellino, 12 miles N.W. of Avellino, has a convent and six churches. Pop. 6328.

Ces'ari, Giusepp'e (called also *Giuseppino* and *Il Cavaliere d'Arpino*), was born in Rome about 1568, painted a number of figures at the age of thirteen, and on the credit of these was introduced to Pope Gregory XIII., by whom, and by his four successors, Popes Sixtus V., Clement VIII., Paul V., and Urban VIII., he was held in high favour as an artist, and liberally patronised. During his lifetime he monopolised public favour, although among his rivals were A. Caracci and Caravaggio; but his style, though animated, was superficial, and destitute of all the essential qualities of art. C. died in 1640.

Cesarott'i, Melchiore, an Italian poet, born 15th May 1730, at Padua, in the university of which he subsequently held the chair of Greek and Hebrew. He was an especial favourite of Napoleon, who loaded him with benefits. C. died 3d November 1808. His style, both in poetry and prose, is vigorous. A complete edition of his works in 42 volumes was published at Pisa (1805–13). Among these are a translation of Ossian (*Poësie di Ossian*), and versions of the Iliad both in verse and prose (*Iliade in Versi* and *Iliade in Prosa*). His essay on the philosophy of languages (*Saggio sulla Filosofia delle Lingue*) is C.'s most meritorious performance.

Cese'na, a town of Italy, province of Forli, on the right bank of the Savio. Its finest buildings are the cathedral, the townhall, and the Capuchin church. C. has silkmills and a trade in wine, hemp, and vegetables. In the neighbourhood are valuable sulphur-mines. Pop. (1872) 33,871. Popes Pius VI. and VII. were born here, the latter of whom, in whose honour a colossal statue has been erected, founded a large hospital at C. Its library, established in 1452, has many valuable MSS.

Cess or **Assessment**. See LAND-TAX.

Cess'io Bono'rum, is a process in the law of Scotland by which a debtor, by making a cession of all that he has to his creditors, obtains an equitable relief. Jurisdiction in questions of C. B. is vested in the Court of Session and in the sheriffs. Any debtor in prison, or against whom a warrant of imprisonment has been issued, may apply for decree of C. B. and for interim protection. This petition is intimated in the *Edinburgh Gazette*. The petitioner then must lodge a statement of his affairs, with relative books and papers, with the sheriff-clerk. On an appointed day the debtor is examined on oath. If any creditor objects to the prayer of the petition, he is heard, and proof of averment will, if necessary, be allowed to him. The sheriff's judgment is subject to the review of the Court of Session, or of the Lord Ordinary during vacation, the Lord Ordinary's judgment being subject to review.

A decree of C. B. operates as an assignation of the movable estate of a debtor in favour of a trustee for his creditors. The trustee is under the supervision of the accountant in bankruptcy. (See ACCOUNTANT IN BANKRUPTCY.) The effect of a decree of C. B. not being to discharge the debtor, but merely to relieve him from the operation of personal diligence (see DILIGENCE), it affords no protection against the attachment by his creditors of any property which he may acquire subsequent to the decree, by his industry or otherwise. But the creditors are bound to realise and apply the property conveyed by the disposition *omnium bonorum* before they can attach that subsequently acquired.

Ces'tius, Pyramid of, built in the reign of Augustus, and still standing at Rome, commemorated a C. Cestius, who had filled respectively the offices of Epulo, prætor, and tribune of the people. It was used as a burial-place, and stands near the Porta Ostiensis (Porta San Paolo). The pyramid is 125 feet high, and 100 wide at the base. It is constructed of brick and tufa faced with marble, and the interior, coated with stucco, is decorated with paintings. There are extensive chambers for sepulture. In the Protestant cemetery in the neighbourhood repose the remains of Keats and Shelley.

Ces'toid Worms, a term formerly applied in zoology to the *Tæniada*, an order of Entozoa represented by the Tapeworms (q. v.) and allied genera on account of their flattened band-like or ribbon-like shape. For the same reason, the newer name of *Platyelmia* or 'Flat-worms' has been applied to the larger division, including the *Tæniada* and *Trematada* or Flukes (q. v.). The *Cystic Worms* (q. v.) are now also ascertained to be merely the immature forms of the Tæniada. The tapeworms, presenting us with familiar examples of C. W., are not true *worms*, and are not allied to the animals ordinarily known as such. Each tapeworm, composed of its numerous *joints* or *proglottides*, is in reality a compound organism; the joints being produced by budding from the *head*, or *nurse*, as it is termed, which latter portion constitutes the true animal. The segments so formed are to be viewed as *zooids*, or individuals, which make up by their assemblage the compound form. Each joint is the exact prototype of its neighbours, and contains little else than perfect male and female reproductive organs, together with certain vessels, belonging to the *water vascular system*, and nerve-cords. The joints forming the neck and head are modified; the head being very small and rounded, and provided with hooks and suckers for the adhesion of the organism to the walls of the intestine of its host. The first few joints constituting the neck are also small and immature; new joints being intercalated between the head and the already formed segments—these joints furthest from the head being thus the oldest or most mature. These organisms thus, in the absence of any distinct digestive system, live by simple imbibition of the fluids of their hosts.

Whilst the growth by budding of the single and compound individual worm is thus provided for by continuous budding, new organisms are also produced by a true process of generation. The joints with their contained eggs or ova—amounting in each joint to several thousands—are continually dropping away from the organism, and being voided by the animal infested by the tapeworm. The eggs can undergo no development within the host which contains their parent organism. But being voided, they are liberated by the decay of the joint, and such of the ova as are swallowed by another warm-blooded vertebrate animal are placed on the further road to development. Each little embryo thus swallowed liberates itself from the egg-capsule, and then consists of a minute vesicle provided with three pairs of flinty hooks. By means of the latter organs, the *proscolex*, as it is called, bores its way through the tissues of its first host, and proceeds sooner or later to ensconce itself within some organ—such as the liver, brain, &c. Here it surrounds itself with a capsule or cyst, and ultimately comes to consist of a little head provided with hooks and suckers, and of a terminal vesicle containing fluid. It is now known as the *resting-larva* or *scolex*; and formerly, when the connection of such organisms with the tapeworms was not understood, the scolices were accounted distinct animals, and were named *cystic worms* and *hydatids*. In this scolex form the animal must finally remain within its first host, and until it becomes introduced into the digestive canal of a second warm-blooded vertebrate host, it cannot develop further. If the flesh containing scolices be swallowed, however, by a second host, each little scolex simply attaches itself by its head to the wall of the intestine; the terminal cyst or vesicle drops off; the scolex head becomes thus the head of the future and mature tapeworm or *strobila*; and a process of budding produces the joints characteristic of the latter form. These developmental stages may thus be summed up:—

1. The egg set free by the liberation of the proglottis from the animal infested by the mature tapeworm or *strobila*.

2. The *proscolex* or embryo burrowing through the tissues of first host, and liberated from the egg.

3. The *scolex* or resting-larva in first host formed from the proscolex.

4. The scolex introduced into second host, losing its cyst, and by budding producing,

5. The perfect and mature *strobila* or tapeworm.

The cystic worms forming measly pork, when eaten by man, thus become developed into the *tænia solium* or tapeworm of man. The cystic worms of the sheep's brain which cause staggers in that animal, if swallowed by the dog, become the *tænia serrata* or dog's tapeworm; and the scolex of the mouse becomes the tapeworm of the cat. See also TAPEWORMS.

Cestra'cion, a genus of *Elasmobranchiate* fishes, including the form popularly known as the Port-Jackson shark (*C. Philippi*), inhabiting the Australian and Chinese seas. This form is the only living representative of the genus, which is included in a special division of the above order—that of the *Cestraphori*. This division is distinguished by the C. possessing a strong spine in front of each of the two dorsal fins, and the hinder teeth are obtusely shaped. An anal fin exists. The mouth of the Port-Jackson shark is filled with flat pavement-like teeth, adapted for crushing the molluscs and crustaceans on which this creature feeds. It is a harmless species of shark. The mouth is placed in front of the head, which is of large size, as also are the eyes. The group is well represented in a fossil state—the fin-spines and teeth of *Hybodus* and *Acrodus* being well preserved in the Mesozoic rocks.

Ces'trum, a genus of Solonaceous shrubs, natives of Brazil, some of which, from the possession of a bitter principle like quinine, can be used as diuretics and for other medicinal purposes. A few are cultivated in our gardens.

Ces'tui que Trust, in English law, is the person or persons in a trust for whom the trustee holds an estate or any interest connected with it. Neither the common law nor spiritual courts having any cognisance in matters of trust, should any question arise between the trustee and the C. q. T., it must be determined by a court of equity. The analogous term in Scotch law is Beneficiary (q. v.). See also TRUST, TRUSTEE.

Cestui que Vie is one for whose lifetime lands or tenements are granted.

Ces'tus (Gr. *kestos*, 'stitched, embroidered'), any band or girth embroidered with love-awakening representations, but applied particularly to the charmed zone or girdle of Venus. With this she captivated Mars; and Juno borrowed it to secure the affections of Jupiter.—**C.**, otherwise **Cæstus** (Lat. *cædere*, 'to kill'), thongs of leather bound round the hands of Greek and Roman boxers to enforce their blows. Latterly it was a most formidable implement, covered with knots and nails, and loaded with lead and iron, and therefore not inappropriately called a 'limb-breaker.'

Ceta'cea, the order of Mammalia including the whales, dolphins, porpoises, and their allies. The Manatees (q. v.) or Sea-cows and Dugongs (q. v.) have been separated from the C., on account of structural differences, to form a separate mammalian order, that of the *Sirenia*. The C. are adapted for an aquatic life, the body being fish-like in conformation. The front limbs are present in the form of swimming-paddles, but no hind limbs are developed, although traces of the pelvic or haunch bones, and even of rudiments of the thigh, may be found in the skeletons of some forms. The body terminates behind in a powerful caudal or tail fin, which is set transversely, or across the body, instead of vertically as in fishes. A dorsal fin may or may not exist. No external ears are developed. The nostrils may be double or single, and being placed towards the top of the head, form 'blow-holes.' The body may be completely destitute of hairs. The testes remain within the abdominal cavity throughout life. The teats number two, and are placed in the groin. The head is generally of disproportional size when compared with the rest of the body, and no distinct neck is perceptible, the vertebræ of this region in fact being anchylosed or ossified together. The lumbar region, or that of the loins, is elongated, and none of the vertebræ coalesce to form the bone seen in most other forms, and known as the *Sacrum* (q. v.). No collar-bones are developed. A single set of teeth only is developed in C., and frequently the adult, as in *Balænidæ*, may be entirely destitute of teeth, although they may be represented in the fœtal or embryonic state. This order of mammals includes the largest of living beings, and is exceedingly interesting, not only from a structural point of view, but also from a commercial aspect, inasmuch as these animals form objects of pursuit for the sake of the oil afforded by the thick layer of fat or blubber which invests the body, reducing its specific gravity and maintaining an equable temperature, and also for the whalebone afforded by some members of the group, for their skins, and for other less notable and special products, such as spermaceti and ambergris.

The order is classified generally into five families. The *Balænidæ* or Whalebone whales, represented by the *Balæna mysticetus*, or Greenland whale; the *B. Australis;* the furrowed whales, such as those belonging to the genera *Megaptera*, *Balænoptera* (Rorqual), and *Physalus* (Finner whales), are chiefly distinguished by the want of teeth in the adult state, and by the presence of baleen or whalebone plates borne by the palate; the blow-holes being placed on the top of the head. The second family is that of the *Physeteridæ*, or sperm-whales, sometimes known as that of the *Catodontidæ*. In these forms no baleen is developed; the lower jaw only possesses teeth in the adult; the head being very large, and forming about one-third the length of the body. The dolphins, porpoises, grampuses, and narwhals (*Delphinidæ*) form the third group, these animals being recognised by their generally possessing numerous teeth in both jaws; by the nostrils being united and placed on the top of the head; and by the head not being disproportionately large—forming only about one-seventh of the body's length. The fourth division is that of the beaked whales (*Rhynchoceti*), represented by the genera *Hyperoodon* of the N. Atlantic, and *Ziphius*, found in the S. Atlantic Ocean and Mediterranean Sea. These whales have a pointed snout or rostrum, a small dorsal fin, a single blow-hole, and a single pair of teeth only, borne by the lower jaw; the other teeth do not cut the gum. The fifth family contains only fossil genera, and is known as that of the *Zeuglodontidæ*. The best-known examples are *Zeuglodon* (from Eocene and Miocene rocks), and *Squalodon* (from Miocene and Pliocene strata). These latter forms had molar teeth implanted by two fangs, and they must therefore have possessed two sets of teeth, or were *diphyodont*.

Cet'erach, a genus of Ferns, to which in former times extraordinary properties were ascribed, *e.g.*, that it had so 'marvellous an influence on the spleen' that it destroyed that not very important organ in the Cretan swine that fed upon it; hence it and other ferns are called to this day 'spleenworts.' On the coast of Wales, our only British species, *C. officinarium*, is used as a bait in rock-cod fishing.

Ceto'tolites, the name applied to certain fossil remains, believed to be the ear-bones, and to teeth presumably of *Cetaceans* (q. v.) or whales. These organisms occur chiefly in the red crag of the Pliocene formations, and may be found in large quantities. It is probable that they may have been deposited in older strata than the Pliocene, and that they may have been washed out into these deposits.

Cetra'ria. See ICELAND MOSS.

Cetra'ro, a coast-town of S. Italy, province of Cosenza, 19 miles N.W. of the city of Cosenza. Pop. about 6000, employed to a considerable extent in anchovy-fishing.

Cette, next to Marseille, the most important haven in the S. of France, and a fortified town of the first rank, in the department of Hérault, lies at the mouth of the Canal du Midi, and is connected with Bordeaux and Lyons by railway. It is built on a tongue of land between the Mediterranean and the navigable Etang de Than, and at the base of a precipitous chalk hill, some 500 feet high, from which it is overlooked by the citadel, while it is further defended by several forts. The harbour admits some 400 vessels, and is sheltered by long moles, on one of which is erected a lighthouse, about 100 feet high. Two beacons also are placed on Fort Richelieu, at a height of 230 feet above the sea. The manufactures are chiefly liqueurs, perfumeries, soap, and chemicals, which are exported in addition to large quantities of wine (Madeira, white Roussillon, &c.), brandy, salt, oil, and southern fruits. C. trades with all parts of the world, and in

1874 there entered the port 1397 vessels of 275,119 tons, and cleared 1598 of 339,997 tons. The sardine and oyster fisheries employ over 350 boats. As a bathing-place, C. attracts yearly some 4000 visitors. Pop. (1872) 24,103. The Mount of C. is the Mons Setius of the ancients.

Cettign'e, or **Cetin'ji**, the capital of Montenegro, 15 miles inland from the Austrian seaport of Cattaro, lies in a rock-girt valley some 3000 feet above the sea. It is a mere village with 700 inhabitants, but is the seat of the government of Montenegro, the see of a bishop, and has a small cathedral and a palace. C. arose round a convent founded here in 1478.

Ceu'ta (Span. *Ce-ūta*, Arab. *Sebta*), a fortified town on the coast of Morocco, belongs to Spain, and has slight fishing and weaving industries. It is situated on the Punto-Leona, opposite Gibraltar, and at the foot of Mount Acho, the ancient *Abyla*, and one of the pillars of Hercules. The seat of a bishop, C. is also the strongest of the four Spanish *Presidios* (penal settlements) on this coast, but it has a bad harbour, and a commonplace cathedral is its only building of any pretence. Pop. 8200, of whom 3500 form the garrison, and some 2500 the prisoners for state and other offences. The other inhabitants are chiefly Arabs, negroes, and Jews. At the base of Abyla lay the two Roman colonies *Ad-Septem-Fratres* (Seven Brothers) and *Ad-Abylam*. A fort here, which was taken (534) by Justinian from the Vandals, bore the name of Septum or Septo in the 7th c. In 618 it was seized by the Western Goths, and in 711 by the Arabs, under whom it became an important town, where paper is said first to have been made by an Arab who brought the art from China. It successively belonged to the Almorades (1084), the Morinides (1273), and the Portuguese (1415). With the subjugation of Portugal by Philip II. it became Spanish in 1580. C. was the only possession on the African coast retained by Spain in 1640, when Portugal regained independence.

Cevennes' is a mountainous district, chiefly in the former political division of Languedoc, which separates the Rhone valley from the northern sources of the Garonne. It is traversed from N.E. to S.W. by a chain of mountains composed of granite overlapped by strata of the Jurassic system, and in the S. by limestone, which forms the '*causses*,' or plateaux terminating in cliffs 600 to 800 feet high. The whole district is tilted up towards the S.E., the highest point, M. Mezen, being 5794 feet in height. Sheep-farming on the upper slopes, and the rearing of silkworms on the lower, are the chief industries. The long winter has created a domestic manufacture of drugget and serge. The population is poor and primitive. It was this district which, after the revocation of the Edict of Nantes (1685), became the scene of the most furious *Dragonnades* against the Huguenots, who were too poor to leave the country, which Louvois wished to make literally 'a desert.' After the martyrdom of Claude Brousson, the people were maddened by the cruelties of the ecclesiastical inspector of missions, Chayla; a prophesying mania descended on them, and under Pierre Seguier, Cavalier, Laporte, Roland, and others, they rose in arms in the year 1702. They were called *Camisards* (from *camisole*, 'a blouse,' or *camise*, 'a white shirt,' or *camis*, 'a road-runner'), and by the Catholics *Barbets* (waterdogs). They burned Catholic churches, killed priests, levied imposts, and for three years maintained a guerilla war against an army of 60,000 veterans commanded by De Broglie and Montrevel. Châteaux were also burned, the priests and Catholics taking refuge in fortified towns. There is no doubt that the French generals were worsted, for the policy by which they prevailed was that of burning 466 Protestant villages, and slaughtering their inhabitants, as well as all those who attended conventicles. Pope Clement XI. granted a general remission of sins to all who should join the Florentines, or White Camisards, a body of royalist bravos organised to suppress them. It was Marshal Villars who finally suppressed the revolt in 1705. See *Histoire des Camisards* (2 vols. Lond. 1744); Court de Gebelin's *Histoire des Troubles des C., ou de la Guerre des Camisards* (3 vols. Villef. 1760; new ed. 1820); and Schulz's *Geschichte der Camisarden* (Weim. 1790).

Ceyl'anite. See SPINEL.

Ceylon' (the *Taprobane* of the classical geographers; Sansk. *Singhala*, Arab-Pers. *Sailan*), a beautiful and productive island, belonging to Britain, lies in the Indian Ocean, to the S.E. of the peninsula of India, from which it is only separated by the Gulf of Manaar and Palk's Strait, lat. 5° 55′–9° 51′ N., and long. 79° 42′–81° 55′ E. It is 266 miles long from Point Palmyra in the N. to Dondera Head in the S., is 140½ miles broad from Colombo to Sangemankande, and has an area of 24,454 sq. miles, and a pop. of 2,128,857, of whom 14,201 are white. The areas and populations of the provinces are as follows, according to an official return of 1870:—

Provinces.	Sq. miles.	Population.
Western	3,345	662,658
North-Western . . .	2,805	214,699
Southern	1,927	353,989
Eastern	4,545	90,601
Northern	6,062	426,597
Central	5,770	371,466
(Military)		2,847
Total . . .	24,454	2,128,857

Physical Features, &c.—In outline C. is pear-shaped, with the apex to the N., and its coast to the N. and N.W. is low and indented, but on the S. and S.E. it is bold and occasionally rocky. Trincomalee on the E. coast has a splendid harbour, and the roads of Colombo on the W. also afford secure anchorage. A rich alluvial belt, some 40 miles broad, encircles the island, and in the N. there is an extensive and fertile plain, while in the S. occurs the lofty highland region containing the heights Pedrotallagalla (8280 feet), Adam's Peak (7420 feet), and the plateau of Newerra Ellia. The centre of the island is partly occupied by a tableland, from 2000 to 3000 feet high, and the mountains are everywhere intersected by picturesque valleys, and are clad with rich forests. By far the largest river is the Mahavelli Ganga (200 miles), but there are many other streams. Those on the E. and N. filled the numerous but now ruined tanks, which formerly contributed so materially to the richness of the country. In the highlands there are several lakes, which supply abundant means of irrigating the rice-lands, and in the flat coast districts lagunes, occurring at intervals, have been made the basis of an extensive system of canals, the massive embankments of which are the ancient work of the Singhalese. The interior is traversed by several carriage-roads, but is still in parts a region of impenetrable jungles, mighty cataracts, and deep ravines.

Climate.—Throughout C. the climate is singularly diversified, but as a whole it is more healthy than that of the Carnatic. The mean temperature at Colombo is about 80°, and on the tableland of Newerra Ellia 62°; while the annual rainfall ranges from 30 to 120 inches. The hottest season is from March to May, after which the monsoons set in, accompanied by torrents of rains. A thunderstorm of terrific violence preludes the S.W. monsoon in May and the N.E monsoon in November, but during the rest of the year there is little atmospheric disturbance. After the rains malaria prevails at the foot of the mountains and on the banks of the rivers.

Productions, Animals, &c.—The far-famed beauty of the island is in great part due to the luxuriance of its vegetation, and the variety and magnificent hues of its flowering plants. Of these, together with ferns (250) and lycopods, there have been enumerated as many as 2670 indigenous species. But the flora of C. contains few genera not to be found on the Indian peninsula. Of the trees, the principal for timber and cabinet-wood are the satin-wood, teak, oak, calamander, ebony, and the Palmyra palm. Near the Buddhist temples the fig is grown, and the cocoa-nut, tamarind, lime, orange, cinnamon, plantain, rose-apple, and cachew-nut are among the other trees. The forests are rank with parasites, and brilliant with the flowers of the coral-tree, ixoras, Jonesias, erythrinas, &c. In the highlands the tree-fern and rhododendron grow to an enormous size. The principal products of the soil are coffee, rice, cotton, pepper, and tobacco. There are now (1876) some 500 coffee plantations, of 150,000 acres, and the average crop is about 950,000 cwt. annually. Of the animals of C., the chief are the elephant, leopard, tiger-cat, hyæna, jackal, bear, racoon, wild boar, and monkey. There are over 320 species of birds, including eagles, peregrine falcons, sunbirds, kingfishers, bulbuls, orioles, swallows, parroquets, pigeons, flamingoes, &c. Crocodiles swarm in the still water-tanks, and land tortoises are numerous. Only a few species of the snakes found are venomous.

Geology, Mineralogy, &c.—The geological formation of C. is mainly metamorphic, and the surface rock is invariably gneiss, overlaid occasionally by crystalline limestone. There is an absence of fossiliferous rocks, with the exception of recent formations on the coasts, as coral, &c. The famous gems of the island, the export of which amounts to £10,000 yearly, are sapphires, rubies, the oriental topaz, garnets, amethysts, cat's-eye, and cinnamon stone. Among the other minerals are the ores of iron, tin, tellurium, nickel, and cobalt, and also plumbago and anthracite. The great pearl-fishery of the Gulf of Manaar yields to the Government an annual revenue of £40,000.

Administration, Commerce, &c.—According to the constitution of 1831, the administration of C. is vested in a governor, an official executive council of five members, and a legislative council of fifteen, including four unofficial representatives. In 1872 the revenue, which mainly arises from customs and sales of public land, was £1,174,698, and the expenditure £1,062,994. The public debt incurred for the construction of railway lines was reduced in the end of 1872 to £640,000. In 1873 the various exports to Great Britain alone amounted to £4,331,006. Besides coffee, the annual value of which is £2,350,000, the staples of export are cocoa-nut oil (in 1873, £285,033) and cinnamon (£113,725). A railway, since 1867, runs from Colombo to Kandy, a distance of 75 miles. The coffee-planting employs some 129,200 Malabar coolies.

Ethnology, Religion, and History.—The inhabitants of C. are mainly Singhalese, a people most probably descended from the Gangetic nation, which is said to have colonised the island in 543 B.C. This people are in great part degraded and effeminate, and of their ancient customs they still cling to polyandry. Another numerous race, the Malabars or Tamils, especially occupying the small island of Jaffna in the N., are the descendants of invaders from the S. of Hindustan. The 'Moormen,' who are variously supposed to be of Arab and Persian origin, are by far the most intelligent of the native communities; while the Veddahs, a tribe of the aboriginal Yakkhos, are little better than savages, one section of them, the Rock Veddahs, having almost, if not altogether, sunk out of the order of human beings. Naturalised Europeans are called 'burghers.' Buddhism is the religion of the Singhalese, and according to the census of March 26, 1871, the number of Buddhists was 1,520,575; of Sivites, 464,414; of Roman Catholics, 182,613; of Mohammedans, 171,542; and of Protestants, 24,745. The treaty of 1815 secures the maintenance of Buddhism in the interior; and the British Government gave up the temple patronage, and the guardianship of the *Dalada* relic, or sacred tooth of Buddha, to the priests in 1847. These latter are divided into two orders—(1) the Samanaros, or ordinary priests, and (2) the Upasampada, or higher grade; but neither are educated, nor receive much respect apart from their office. C. has many splendid temples and shrines of great antiquity, of which perhaps the most remarkable is the ruined Dagoba of Jaytawanarama, 249 feet high, and 360 feet in diameter. It has been estimated that the erection of such a massive structure, even now, would occupy 500 bricklayers from six to seven years. The cave-temple of Dambool, built in 100 B.C., is loaded with sculptured ornament, at once gorgeous and grotesque. Another object of interest is the sacred Bo-Tree (q. v.) of Anarajapoora, which was planted, according to record, in 288 B.C., and is therefore the oldest known tree in the world. The prudence and energy of the old Singhalese kings is seen in the colossal reservoirs and numerous tanks, now partly ruined, scattered throughout the country.

The history of C. as far back as 543 B.C. is made known to us chiefly by the famous *Mahavanso*, a poetical chronicle in the Pali language, the authority of which, however, as a historical document, is at present challenged by scholars. The writer describes the invasion in 543 B.C. of Wijayo, a Gangetic prince, who subdues the Yakkhos, and founds the dynasty of Sihala (hence *Singhalese* and *C.*). Of the many kings of this line, the most renowned was Prakrama Bahu (1153), during whose reign 1470 tanks ('the seas of Prakrama') were constructed. Several invasions are recorded of hordes from the Malabar coast, but more noteworthy is the first visit, in 1505, of the Portuguese, who formed a settlement near Colombo, and after a career of gross cruelty and extortion, were driven out by the Dutch in 1658. The island was captured by a British expedition commanded by Colonel James Stuart in 1796, and was eventually ceded to Britain at the Peace of Amiens, March 27, 1802. The interior was still held, however, by the Kandyan king, Wikrama Raja Singha, who continued to rule his subjects with savage brutality. Certain native merchants, British subjects, having been seized and murdered by the King, war followed, and the Kandyan territory was annexed to the British crown in 1815. See Sir James Emerson Tennent, *C., Physical, Historical, and Topographical, &c.* (Lond. 1859); *Christianity in C.* (Lond. 1850); Dr Paul Goldsmidt, *Official Report on the Ancient Inscriptions in C.* (1875); L. de Zoysa, *Official Report on the Ancient MSS. in the Temple Libraries of C.* (1875); and *C., a General Description of the Island, Historical, Physical,* and *Statistical,* by an Officer, late of the Ceylon Rifles (2 vols. Lond. 1876).

Ceylon Moss, a seaweed sometimes imported, under the name of *Agar-agar*, for the sake of the nutritive, emollient, and demulcent jelly or decoction which can be made of it for the food of invalids and children. It is the product of *Gracilaria lichenoides* (*Plocaria candida*), *Gracilaria confervoides*, and other species of *Gracilaria*.

Ceyx. See KINGFISHER.

Cezim'bra, a seaport town, province of Estremadura, Portugal; about 20 miles S. of Lisbon, with an active fishing trade. Pop. about 5000.

Chab'lis, a town of France, department of the Yonne (Lower Burgundy), 11 miles E. of Auxerre. It has manufactures of cotton fabrics and biscuits, but the great source of its prosperity is the trade in wine. C. gives name to a white Burgundy of the second quality, which keeps its colour better than all other wines of the same sort, has considerable strength, and is very pleasant to the taste.

Chac'ma. See BABOON.

Chadd'a. See BENUE.

Chad'wick, Edwin, C.B., an eminent social reformer and economist, was born near Manchester, January 24, 1801, and was called to the bar in 1830, but never practised. An article on life assurances in the *Westminster Review* in 1828 attracted the notice of Jeremy Bentham, who left him a part of his library and a legacy. He was appointed assistant-commissioner to inquire into the working of the poor-laws in England and Wales, and his report, which was published in 1833, may be said to have been the main cause of the poor-law reforms which followed. C. was appointed secretary to the new Poor-Law Board, and subsequently Commissioner of the Board of Health. He retired from this post in 1854 with a pension. C. has been of great service to his country by the reports on various subjects, such as the condition of the Civil Service, the constitution of the constabulary force, the sanitary state of the country, pauper and industrial education (1859-60), which he has given either voluntarily or as a special Government commissioner. From the first he has taken a keen interest in the proceedings of the Association for the Promotion of Social Science. In 1868 he unsuccessfully contested the Kilmarnock Burghs against the sitting member, Mr Bouverie.

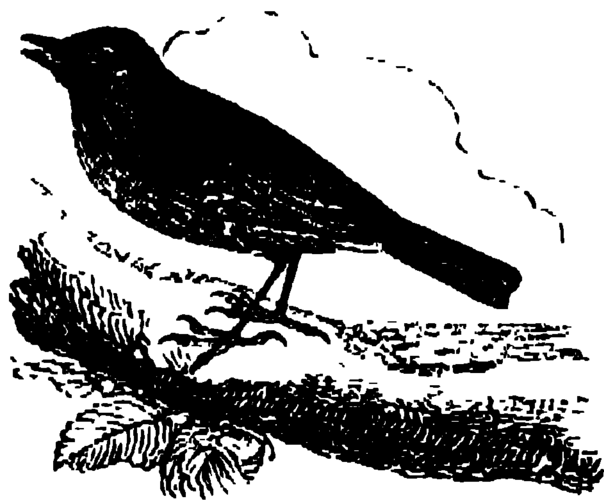
Chæronei'a (said to have been named after Chæron), a town of Bœotia, ancient Greece, near the Cephissus. Standing in a plain that commanded the entrance from Phocis to Bœotia, it became naturally the scene of many important military operations. It was captured by the Athenians B.C. 447, and again by Phalæcus during the Phocian war. At C., Philip, by defeating the allied forces of the Athenians and Bœotians (B.C. 338), destroyed the separate autonomies of the Greek states. The mound which covered the Thebans who fell in the battle was recently opened, and a colossal lion, emblematic of the spirit of the Thebans, and referred to by Pausanius and Strabo, was disinterred. At C. (B.C. 86) the generals of Mithridates were defeated by Sulla. A few remains of the citadel and some traces of the theatre still exist. The site of C. is now occupied by the modern village of *Kápurna*.

Chæ'todon, a genus of Teleostean fishes belonging to the family *Chætodontidæ*, a group distinguished by the compressed body, by the median fins being covered with scales of the ctenoid kind, by the dorsal fin being single, with a few spiny rays at its front portion, and by the ventral fins being jugular, or placed beneath the pectorals. These fishes mostly inhabit the tropical seas, and are generally brilliantly coloured, being

banded in various elegant ways. From the scaly nature of their fins, the name *Squamipennes* was formerly applied to them. In C. itself the teeth are slender. In the genus *Brama*—of which genus the species *B. Raii* occurs in British seas—the teeth are curved and of stronger make. *Chelmon* is another genus common in Chinese waters, and, together with the *Toxotes* of Java, has the curious habit of shooting at flies with drops of water, so as to cause the insects to fall into the water, a habit which has gained for them the name of 'Archer fishes' (q. v.).

Cha'fer, a popular name given to many beetles (*e.g.*, rose C., cock C., bark C., &c.), the larvæ of which burrow into plant-tissues, and cause much damage to trees and shrubs. The name is merely a popular one, and has no scientific value.

Chaff'inch, Sc. **Shilfa** (*Fringilla cœlebs*), a species of *Fringillinæ* or true finches, Conirostral birds belonging to the order Insessores. The C. averages about 6 inches in length; the male being coloured bluish-grey in summer on the head and neck, with a chestnut back and black wings, which bear two white bars; the tail is black. The female resembles the male in her colours, which, however, are much less bright than those of her mate. The bird is found in Europe, Asia, N. Africa, and the Azores. It flies southward in winter from its northern habitats. In winter the sexes seem to separate, this fact having induced Linnæus to apply to the C. the specific name *Cœlebs*. Other naturalists, however, have suggested that these winter flocks really include young males, which somewhat resemble the females in their colours. The eggs number four or five, and are of a buff colour streaked with brown. The food consists of insects, but also of seeds and young plants—these birds are therefore destructive in gardens. The notes are clear, and the song, when trained, is very fine.


Chaffinch.

Chaff-Cutter. When it was found that chopped straw was much more economical than straw as it comes from the thrashing-machine, the chaff-cutter was designed to do away the old knife. The cutter is composed of two curved knives set in an iron wheel frame, and the straw is put in in bunches. It is self-feeding and can be made to cut any length.

Chag'res, a seaport in the department of Colon, republic of Columbia, at the mouth of the Rio de C., 6 miles W.S.W. of Aspinwall. It had a good trade prior to the opening of the Panama Railway in 1855, but is fast sinking into insignificance. The climate is extremely hot and unhealthy. Pop. 1000, mostly negroes. A project of basing an inter-oceanic canal on the *Rio de C.* was abandoned on account of the rapid flow of the river and the numerous waterfalls in its course.

Chaill'u, Paul Belloni du, the author of several works of African travel and adventure, was born in the S. of France about 1820. His father, a trader and consular agent of France at the river Gaboon, in the French West-African settlement of that name, carried C. thither when still a child. Educated at a Jesuit school in the Gaboon settlement, C. soon made himself acquainted with the customs and languages of the native tribes. In 1855 he visited North America, was naturalised at New York under the name of *Chaylion*, and became a member of the Philadelphia Academy of Natural Sciences, from whom in the same year he received the commission to penetrate from the W. coast into the interior of Equatorial Africa towards the sources of the Congo, and to report on the botany and zoology of the regions he should visit. This expedition employed C. for four years, during which time he made many surprising discoveries, the chief of which was his discovery of the Gorilla (q. v.). The first specimen of this immense creature killed by C. is preserved, together with many specimens of birds previously unknown, in the British Museum. A subsequent expedition was undertaken from the mouth of the Fernan-Vas River to Ashango Land in 1863. C.'s chief works, which are tinged with a certain hue of insincerity and exaggeration, and the first of which was, for a time, regarded by many as an imposition, are *Explorations and Adventures in Equatorial Africa, &c.* (New York and Lon. 1861), and *A Journey to Ashango Land*, (1867). Since 1867 C. has been established in America, where, as a lecturer and a writer of books of adventure for the young, he has won considerable popularity.

Chain, a measure used in surveying. 'Gunter's' C. is 66 feet long and divided into 100 links. One square Gunter's C. is one-tenth of an acre. Engineers frequently use a C. of 100 feet long, which has many advantages over the shorter one.

Chain Bridge. See SUSPENSION BRIDGE.

Chain Cables. See CABLES.

Chain-Mail or **Chain-Armour**, a defensive garment made of hammered iron links, which was much used in the 12th and 13th centuries. It was more flexible than plate-armour, but was not a certain protection against the thrust of a lance.

Chain-Shot, a nearly obsolete kind of ammunition, consisting of two cannon balls connected by a short chain, designed to destroy the rigging of ships. As Grapeshot (q. v.) has been found to answer the same purpose, the manufacture of C.-S. has been discontinued.

Chains, Hanging in. In former times it was usual to hang the bodies of atrocious criminals, after execution, in chains, on a gibbet near the spot where the crime had been committed. The spectacle was supposed to have a deterrent effect, and to give consolation to those who had suffered by the crime. An Act abolishing the practice was passed in 1834.

Chair, an article of furniture used as a seat, differing from a stool in having a rest for the back, and occasionally with supports for the arms. In a dwelling-house chairs are usually designed to harmonise with the other furnishings of the apartment in which they are placed, and therefore they vary very much in form and constructive materials. The chairs of the ancients were often of the most costly description, and their elegant forms have been frequently reproduced and varied by modern cabinetmakers. Numerous examples of antique seats are preserved in national European collections. Of the Egyptian chairs in the British Museum, one is formed of ebony, inlaid with ivory, except the seat, which is of plaited cane, as in modern chairs. The Romans, as well as the Greeks and Egyptians, constructed seats long enough to suit two persons. Two such *bisellia* in bronze, discovered at Pompeii, are now in the *Museo Borbonico* at Naples, and reproductions of them may be examined in the South Kensington Museum. Among other ancient and interesting chairs meriting notice may be mentioned that of St Peter, formed of wood overlaid with carved ivory work and gold, preserved in the Church of St Peter at Rome, and that of Dagobert, King of France in the 7th c. (now in the Louvre at Paris), made of bronze, partially gilt, and beautifully chased and chiselled. The chief English seat of the C. trade is at High Wycombe and neighbourhood, where extensive beech-woods supply material for common chairs. For the finer kinds of chairs, walnut, rosewood, mahogany, birch, oak, sycamore, and cherry are employed.

Chala'za. See OVULE and EGG.

Chalce'don, a city of ancient Bithynia, at the mouth of the Euxine, about 2 miles S. of the modern Scutari. It was founded by colonists from Megara seventeen years before Byzantium; and the settlers are said to have been alluded to by the oracle as 'blind,' for having selected an inferior site when a better was in their choice. It soon, however, acquired importance, and possessed many temples. During the struggles between Athens and Lacedæmon it changed sides several times: in B.C. 74 it came into the possession of Rome; under the empire it was a free city; Chosroes, the Persian, took it A.D. 616; and finally under the Turks it sunk into absolute ruin.—The *Council of C.*, held here A.D. 451 by command of the Emperor Marcian, condemned the heresies of the Nestorians (q. v.) and Monophysites (q. v.). It declared that in Christ there were two natures, so distinct that they could not be intermixed, yet so conjoined that in Christ there was but one person.

Chalce'dony, a variety of quartz occurring in mammillated, botryoidal, and stalactitic forms, found abundantly in many parts of Europe, and deriving its name from Chalcedon in

Asia Minor, where it was originally obtained. Agate, chrysoprase, carnelian, cat's eye, plasma, onyx, sardonyx, sard, flint, and hornstone, which are separately described under their respective heads, are all varieties of C. Common C. is usually semi-opaque, of a milk-white colour, tinged with yellow or blue, and occurs in Fifeshire, the Pentland Hills, the Hebrides, Faroe Isles, and in Cornwall and other English localities. It was largely used for minute sculpture by the ancients, and at the present day seals, brooches, vases, &c., are made of it.

Chalce'donyx, a variety of chalcedony, with alternate stripes of opaque white and translucent grey.

Chal'cis, the capital of Eubœa (Negropont), on the Strait of the Euripus, here 40 yards across, separating the island from the coast of Bœotia, but bridged over now, as it was also in ancient times. C. was a city of great antiquity, and is mentioned by Homer. It was one of the greatest of the Ionian cities, and sent out colonies to Macedonia, Italy, Sicily, and the Ægæan Isles. It had at first an aristocratic government of its own, but afterwards became tributary to Athens. Under the Macedonians and the Romans it rose to great importance, as it commanded the navigation between the N. and S. of Greece. After the Venetians had held it for three centuries it was taken by the Turks in 1470. C., now called *Egripo* (q. v.), a name which is a corruption of Euripus, is the only considerable place in the island. Pop. (1870) 6447.

Chalcis, a genus of *Lacertilia* or lizards, included in the family *Chalcidæ*, and distinguished by being covered with scales arranged in cross rows; those of the back being prominent or keeled, and frequently spinous, whilst the sides may possess folds of skin covered with scales. The eyelids are developed, the ears exposed; the tongue fleshy, short, and bifid at the top. These lizards occur in both America and Africa, and a few in Asia.

The name C. is also given to a genus of *Hymenopterous* insects of minute size, with nearly veinless wings, and bent antennæ. The palpi are short, and the pupa destitute of a cocoon.

Chalcog'raphy (Gr. *chalcos*, 'copper or brass,' and *graphein*, 'to write'), engraving on copper. See ENGRAVING.

Chaldæ'a. See BABYLONIA.

Chaldee'. See ARAMÆA.

Chal'der, a dry measure, formerly used in Scotland, which contained sixteen bolls. See BOLL.

Chal'dron (Fr. *chaudron*, Lat. *caldarium*, 'a vessel for warm water'), an old dry measure, containing thirty-six heaped bushels, sometimes used in selling coal.

Chaleur' Bay, an inlet of the Gulf of St Lawrence, separates New Brunswick from the district of Caspé, receives the Ristigouche, extends from E. to W. for a distance of 100 miles, and has a maximum breadth of 20 miles. It receives its name (Fr. *chaleur*, 'heat') from its comparative freeness from ice in winter.

Chalif'erous Membrane. See EGG.

Chalk, Black, or **Drawing-Slate**, a kind of clay-slate, soft, black from the admixture of carbon, and used for drawing or writing.

Chalk, Red, a compact earthy clay, coloured with from 15 to 20 per cent. of oxide of iron, also called *reddle*.

Chalk, French, a variety of soapstone or steatite, a magnesic silicate.

Chalk Rocks. See CRETACEOUS SYSTEM.

Chalk'ing the Door is, in Scotland, a mode of warning the tenants of burghal tenements to remove. The principal door of the tenement is marked with chalk forty days before Whitsunday, the Scotch term for removal. A certificate of execution, subscribed by the officer and two witnesses, is a warrant for a decree of removal by the burgh court. If the tenant does not obey the decree, he may be forcibly ejected on the expiration of a charge of six days.

Chall'enge. See DUEL and JURY.

Chalm'ers, George, a historical antiquary and critic, of good family, was born at Fochabers in Morayshire in 1742. Educated at King's College, Aberdeen, he was trained to law in Edinburgh, but emigrated to America in 1763, and practised as a lawyer in Baltimore. A strong royalist, the revolutionary troubles compelled him to return to England, where he was appointed clerk to the Board of Trade in 1786. The remainder of his life was spent partly in erudite toil, and partly in miscellaneous pamphleteering. He died May 31, 1825. C.'s chief work is his *Caledonia, an Account, Historical, and Topographical, of N. Britain* (1807–24). It shows immense research, and the introduction is marked by a vigorous, and on the whole rational, conception of the state of Scotland ethnologically in the long and obscure period between the Roman invasion and the reign of Malcolm Canmore. The style lacks elegance and dignity, but its polemical tone gives it a factitious energy and liveliness. Of C.'s other productions, the most important is his edition of the *Poetical Works of Sir David Lindsay, with a Life of the Author, Prefatory Dissertations, and an Appropriate Glossary* (3 vols. 1806), which cannot be held to be superseded even by the later edition of Laing (2 vols. Edinb. 1871). His Lives of Defoe (1786), Ruddiman (1794), and Allan Ramsay (1800) are also noteworthy.

Chalmers, Thomas, an illustrious Scottish preacher, theologian, Church leader, philanthropist, and social reformer, was born at Anstruther, March 17, 1780. He matriculated as a student in St Andrew's University in 1791, became a licentiate of the Church of Scotland in 1799, having been admitted at an unusually early age, on the special plea that he was 'a lad o' pregnant pairts,' and in 1803 was ordained minister of Kilmany, a sequestered parish in the E. of Fife. At this time he was engrossed in scientific studies, which he pursued with such success, that he felt warranted in becoming a candidate, successively, for the Natural Philosophy chair at St Andrews, and for the Mathematical chair at Edinburgh. In 1808 appeared his *Inquiry into the Extent and Stability of National Resources.* About 1811, after a severe illness, and while preparing the article 'Christianity' for the *Edinburgh Encyclopædia*, C. experienced 'a great revolution in all his opinions about Christianity,' and 'this very great transition of sentiment' he attributed to the reading of Wilberforce's *Practical View*. As a result of this change, he abandoned his scientific pursuits, and put forth all his strength as a pastor and as a preacher of evangelical Christianity. In 1812, C. married Miss Grace Pratt. In 1814 he was appointed minister of the Tron Kirk of Glasgow, and during the nine years of his Glasgow ministry (from 1819 in the parish of St John's), he exercised a most commanding influence by the brilliancy and power of his pulpit oratory. His pulpit fame may be considered to have reached its height on the delivery of his famous *Astronomical Discourses* in 1816, and on his visit to London in 1817. 'All the world,' wrote Wilberforce, 'mad about C. Mighty London seems to do him homage.' 'The tartan,' said George Canning, 'beats us all.' During his residence in Glasgow, C. grappled manfully with the appalling ignorance and immorality of his populous city parishes, and indeed he accepted the incumbency of St John's on the condition that he should work 'his own parish in his own way,' and with the view of making, in opposition to the poor-law system of England, the famous experiment, in which he managed the whole pauperism of the parish by a Church agency, and with an income of about £300 kept down the pauperism of a population of 10,000. These great exertions, however, were too much for his constitution, and he accepted the proffered chair of Moral Philosophy at St Andrews, whence, in 1828, he was translated to the chair of Divinity at Edinburgh. His *Political Economy* appeared in 1832, and his Bridgewater treatise on *Adaptation of External Nature to the Moral and Intellectual Constitution of Man* in 1833. C. was chosen Moderator of the General Assembly of 1832. Between 1835 and 1841, by his great exertions in the cause of church extension, a sum of £305,747, 11s. 2½d. was raised, and 222 churches, more than one-fifth of its whole complement, were added to the Establishment. In 1838 he delivered in London his brilliant course of lectures in defence of religious Establishments. Throughout the Ten Years' Conflict of the 'Evangelical Party' on behalf of the Church's 'spiritual independence,' C. was their resolute and unwearied leader; and on the formation of the Free Church, May 18, 1843, he was called to the chair of

its first General Assembly. He rendered it great service, especially by the constitution of its general Sustentation Fund, and he was chosen Professor of Divinity and Principal of its New College at Edinburgh. During his closing years of life, he planted in the West Port the territorial agencies that have since been so successfully employed both in Edinburgh and Glasgow in elevating the most degraded of our population. C. died suddenly at Morningside, Edinburgh, May 30, 1847. C. was elected D.D. of Glasgow in 1816, corresponding member of the Royal Institute of France in 1834, a Vice-President of the Royal Society of Edinburgh in 1835, and Doctor of Laws, Oxford, in the same year. These and many similar honours attest the great reputation enjoyed by C. during his life, a reputation which his books, wise, eloquent, and powerful though they be, can scarcely be expected adequately to maintain. The fame of C., however, will not be affected by the good or ill fortune of his books. His fiery energy, his perfervid genius, his single-hearted devotion to philanthropic work, the nobility of his aims, the width of his sympathies, and the goodness of his heart, secure for his name a place in the brief roll of great representative Scotchmen. See *Memoirs of the Life and Writings of Thos. C.* (Edinb. 1849), by his son-in-law, the Rev. Dr Hanna. The standard edition of his works is in thirty-four volumes (Edinb. Edmonston & Douglas).

Châl'ons-sur-Marne, the capital of the department Marne, France, on the Marne, the Marne-Rhine Canal, and the Strasburg Railway, 107 miles E. of Paris. It is old, irregularly built, and its ramparts are in great part destroyed, but it has many fine edifices, as the cathedral St Etienne, which was partly rebuilt in the 17th c., after having been burnt three times; the church St Alpin, dating from the 12th c.; the abbey St Pierre; the church of Notre Dame, &c. By the side of the canal of the Marne is a splendid public park (*Jard*) of 19 acres. The river is here crossed by a fine stone bridge. C. has manufactures of woollens, serge, bonnets, rope, &c., and a large trade, chiefly in Champagne wine, of which it exports annually about 1,000,000 bottles. Pop. (1872) 15,186. To the N.E. of the town is the Camp of C., formed by the Emperor Napoleon III. in 1856, and occupied successively by Canrobert and MacMahon during the late Franco-Prussian war. The Germans took possession of C. without opposition, August 21, 1870. C. is the ancient *Catalaunum* or *Durocatalaunum* of Gallia Belgica. Here Aurelian, in 274 A.D., overthrew Tetricus, and in 366 Jovinus defeated the Allemanni. The neighbouring plain (*Campi Catalaunici*) witnessed, in 451, the grand repulse of Attila and his Huns by the Roman and Visigothic forces.

Châlon-sur-Saone, a town in the department Saône-et-Loire, France, 35 miles N. of Mâcon by railway, on the Saône, here crossed by a magnificent iron bridge. It has a fine church of the 14th c., and is an active industrial centre. There are several distilleries, foundries, and a Government naval yard supplementary to that of Creuzot. The river is navigable for steamboats from this point, and C. does a large trade with the Mediterranean and the Atlantic in wine, iron, and cereals. Pop. (1872) 18,951. C. is the ancient *Caballonum* or *Cabillinum*, and was a flourishing place during the Roman occupation.

Chalybæ'us, a genus of birds inhabiting New Guinea, and noted for the brilliant metallic tints and lustres of their plumage. Skins of *C. Paradisæus*, with the feet cut off (to imitate the condition in which Birds of Paradise (q. v.) skins are generally imported), have been sold as skins of the latter birds. The bill in the genus is thick, and the nostrils are pierced in a broad Cere (q. v.).

Chalybæus, Heinrich Moritz, a German philosopher, was born 3d July 1796 at Pfaffroda, Saxony, and studied at Leipsic. After teaching for several years at Vienna and Dresden, he was in 1839 appointed a professor in the University of Kiel. After the Slesvig-Holstein war he had to resign his professorship, but in a short time he was restored. He died at Dresden, 22d September 1862. Of his numerous works, the most important are the *Historische Entwickelung der Speculativen Philosophie von Kant bis Hegel* (Dresd. 1836, 5th ed. 1860), of which there is an English translation by Tulk (Lond. 1854); *System der Speculativen Ethik* (2 vols. Leips. 1850); and *Fundamental Philosophie* (Kiel, 1861).

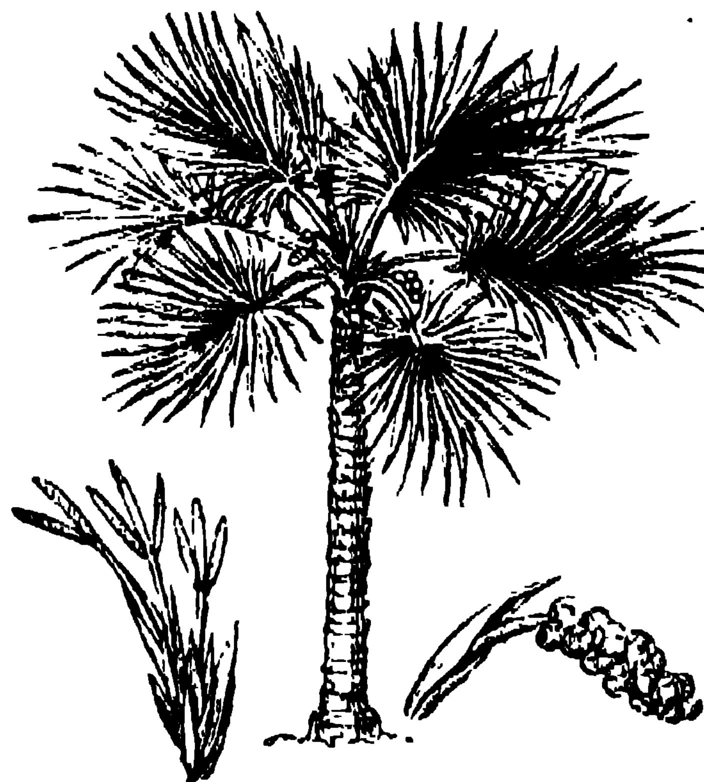
Chalyb'eate (from Gr. *chalups*, 'iron') **Waters**, a form of mineral water, containing salts of iron in solution, the most common being that in which carbonate of iron is held in solution by an excess of carbonic acid. On exposure to the air such a water gives off carbonic acid, and deposits ferric hydrate in a state of fine division, which is the cause of the ochry appearance around such springs. C. W. have a kind of inky taste, and are in high repute for their tonic and invigorating effect on invalids. They are very numerous, Tunbridge Wells being an excellent example of the carbonated series.

Cha'ma, a genus of Lamellibranchiate mollusca, belonging to the *Siphonate* division of that class, and forming the type of the family *Chamidæ* or 'Clam-shells.' They possess inequivalve shells, which are attached to fixed objects. The mantle is closed, and the foot is of very small size. These shells occur chiefly in warm and tropical seas. The genus *Diceras* is also included in the family *Chamidæ*.

Chamade'. See PARLEY.

Chamædo'rea, a genus of palms containing upwards of forty species, natives of the forests of tropical America. The reed-like stems are used for walking-sticks, and the other unexpanded flower-spikes by the Mexicans as a potherb, under the name of *Tepejilote*.

Chamæ'rops, a genus of palms, the most northern of its order containing ten or twelve species, natives of Asia, Africa, America, and Southern Europe. They are generally dwarf in habit. *C. humilis* is the only European species, extending, however, only as far N. as Nice. From the leaves are made hats, brooms, baskets, thatch for houses, &c., and a fibre which is used as a substitute for horsehair. The coarse fibre at the base of the leaves is mixed by the Arabs with horsehair, to weave their tent-covers out of. In Algeria a paper and pasteboard are made of it, and in Spain, cordage and sailcloth; in France, where it is known as *African hair*, carpets are wove out of it. *C. fortunei* is a Chinese species. The coarse fibre from the base of the leaves is used in China to make hats, and the capes worn in wet weather by the rural population. The genus will grow in the open air very well as far N. as Edinburgh.


Chamærops—Palmyra Palm.

Chamala'ri, or **Chumalarhi**, a lofty peak of the Himalayas, on the N.W. frontier of Bhotan, some 80 miles N.E. of Darjiling, has a height of 23,944 feet. On its W. side rises the Ammochu river, a tributary of the Brahmaputra.

Chamber-Counsel, a barrister, or advocate, who devotes himself chiefly to giving legal opinions, seldom pleading in court.

Chamber of Commerce. Associations of merchants and others interested in trade, for the promotion and benefit of trade, are so called. Of foreign origin, these institutions have in Great Britain proved themselves especially valuable to the country. The Edinburgh C. of C., instituted in 1785, and incorporated by royal charter in 1786, was the first public body in the country which petitioned Parliament for an adoption of free-trade principles and for the abolition of the corn-laws. It also originated the movement which ended in the telegraph service being taken over by the state. This chamber consists of about *six hundred members*. The Manchester C. of C. was established in 1820. Its exertions in the cause of free-trade and their splendid results are of world-wide renown. (See FREE TRADE.) Chambers of Commerce now exist in all the great mercantile towns of Great Britain and Ireland. In 1860 there was established an 'association of Chambers of Commerce of the United Kingdom.' The C. of C. endeavours to attain its object by the consideration of all pro-

posed legal measures affecting trade, and by petitioning Parliament according to the views of a majority of its members; by the collection of statistics bearing on the especial trade of its district, and by the advantage which combined has over individual enterprise. The C. of C. is also sometimes useful as a court of arbitration in mercantile questions; though it is to be feared that the expense and anxiety of ordinary legal procedure can never be wholly got rid of by any scheme for settlement by Arbitration (q. v.). The oldest C. of C. in France is that of Marseille, which was founded upwards of four centuries ago. The next in seniority is that of Dunkerque, established in 1700. The various chambers of France were suppressed in 1791 by a decree of the National Assembly, but they were reconstituted by a consular decree in 1802. Their organisation is now regulated by ordonnances of September 1851 and August 1852, their functions being to advise the Government as to the means of improving the national industry by legislation and the execution of public works, and as to taxation. The oldest C. of C. in Great Britain is that of Glasgow, which was instituted by royal charter in 1783.

Cham'berlain, Lord, was in former times an important member of Government in England, but his functions are now chiefly connected with the royal household. The Queen's tradesmen and artificers are appointed by him. All theatres in towns in which there is a royal palace require a licence from him, and without his licence no new play can be acted anywhere. He has a vice-chamberlain under him, and both are privy councillors, their tenure of office being dependent on that of the ministry of the time, of which the L. C. is a member. The salary of the L. C. is £2000 a year, that of the vice-chamberlain, £924. The Chamberlain of Scotland was an officer of high dignity and of supreme jurisdiction, but the office has been long since abolished.

Chamberlain, The Lord Great, is an officer of considerable importance. He is governor of the palace of Westminster, and on a coronation, or other solemn occasion, the keys of Westminster Hall are delivered to him. He has the care of the House of Lords during the sitting of Parliament. The Gentleman Usher of the Black Rod, Yeoman Usher, &c., are under his authority. The office is hereditary. It was originally conferred by Henry I. on Alberic de Vere. From the De Veres, Earls of Oxford, it passed to the Berties. It is now held conjointly by Lady Willoughby de Eresby and the Marquis of Cholmondeley as coheirs of the fourth Duke of Ancaster.

Cham'bers, Ephraim, F.R.S., born at Kendal towards the close of the 17th c., formed the plan of his Encyclopædia, the earliest work of the kind in English, while apprentice to Mr Senex, a mathematical instrument maker in Fleet Street, London. The 1st edition, in 2 vols. folio, was published in 1728; the 2d, in 1738; the 3d, in 1739; the 4th, in 1741; a 5th, in 1746; and a 6th, with additional matter, in 1750. C. died at Islington, 15th May 1740. Considered as the work of a single individual, the Encyclopædia of C. is an extraordinary production.

Chambers, William and **Robert,** eminent publishers and authors, were born at Peebles, William in 1800, and Robert in 1802. After a grammar-school education at his birthplace, the former became, in his fourteenth year, apprentice to an Edinburgh bookseller. In 1819 he commenced business on his own account—a somewhat adventurous attempt, since he was, as he himself says, 'without stock, capital, or shop-furniture.' Robert began business in his sixteenth year, after a still more humble fashion than his brother, by starting a street bookstall for the sale of works cheap and old. A magazine called the *Kaleidoscope* (1821), written by the younger brother, and printed by the elder, was their first joint literary venture. Among the productions of Robert in this early and less distinguished period of his career were *Traditions of Edinburgh* (1824), *Popular Rhymes of Scotland* (1826), several histories of Scotch rebellions, and a *Life of James I.* (1830). He also edited a *Biography of Distinguished Scotchmen*, in 5 vols. In 1832 William originated *Chambers's Edinburgh Journal*—a periodical which was at once successful, and still retains in undiminished degree its excellence and its popularity. After the fourteenth number, Robert became joint-editor, and the firm of William and Robert C. was established. By the sterling merits both of the publishers and their works, it soon became, and has ever since continued to be, one of the foremost firms in the northern part of the kingdom. The people of Scotland have long regarded it with a feeling of national pride not bestowed on any other firm however eminent. Among the works published by them are an *Educational Course*, *Cyclopædia of English Literature* (new ed. 1876), and *Encyclopædia of Universal Knowledge* (1868, new ed. 1874). These works are all meant for the people, but the literature and the instruction are of a high order of merit. Robert C. has also produced incomparably the most valuable biography of Robert Burns (4 vols. 1851), and has written on geology and antiquities. In 1863 the degree of LL.D. was conferred on him by St Andrew's University. This distinguished author and archæologist died 17th March 1871. William C. has written books on America, pamphlets on social questions, notes of travel, and a *Memoir of Robert C., with Autobiographic Reminiscences of William C.* (3d ed. 1872). He gifted a free library and lecture-hall to his native town of Peebles. In 1865 he was chosen Lord Provost of Edinburgh, and signalised his rule by a great scheme for the improvement of the city, of which Edinburgh is now witnessing the splendid result. The career of both men presents a fine example of the industrious, successful, and intellectual Scot.

Chambers, Practice before a Judge or Vice-Chancellor at. This term of English law is applied to the arrangement of certain minor matters by the summary decision of a single judge at chambers.

Cham'bery, the capital of the department Savoié, France, lies in a rich valley on the Leyse, 45 miles W.S.W. of Geneva, at an elevation of about 1000 feet above the sea. It is the see of an archbishop, the seat of a superior tribunal, and of the Academy of Savoy, and has manufactures of gauze, silk-lace, leather, hats, watches, &c., and a trade in iron and wine. Pop. (1872) 13,417.

Chambe'ze, an important river of Central Africa, forming the head-waters of the Luapula, rises in the Kitwelte Mountains, 75 miles S. of Lake Tanganjika, flows S. and S.W., and enters the W. end of Lake Bangweolo, after a course of 100 miles. It is 1200 feet broad before entering the lake, and has numerous tributaries, of which the chief are the Lokutu, Mansia, Lokischa, and Mapampa. The C. was confounded with the Zambeze (q. v.) till Livingstone explored the region in February 1867. See *The Last Journals of David Livingstone* (2 vols. Lond. 1874).

Cham'bord (Henri Charles Ferdinand Marie, Dieudonné d'Artois, Duc de Bordeaux), Comte de, the representative of the elder or Legitimist branch of the Bourbons, grandson of Charles X. and son of Prince Charles Ferdinand d'Artois, Duc de Berri (murdered February 14, 1820), and was born September 29, 1820. As the Duc, at the time of his death, left only a daughter, there were great rejoicings on the occasion of C.'s birth seven months afterwards, and he was baptized in water brought from the Jordan by Chateaubriand, and termed 'the Child of Miracle.' Charles X. attempted to abdicate in favour of C. in 1830, but the French people banished the elder Bourbons, and C. along with them. C. then travelled through Europe, lived for a time at Holyrood, and on the death of his rival, the Duc d'Angoulême, in 1844, held a court in Belgrave square, and received the homage of all the Legitimists. In 1846 he married the Princess Maria-Theresa, daughter of the Duke of Modena, but is childless. After the fall of the Third Empire, and the capitulation of Paris in 1871, C. returned to France, and a 'fusion' of Legitimists and Orleanists was effected to support his claims to the throne as Henri V. In 1873 there was for a moment a probability that he would be proclaimed king, but the foolish and fanatical manifesto he issued, maintaining his divine right to the throne, and asserting his intention to maintain in its ancient integrity the temporal power of the Pope, has apparently blasted his prospects.

Chambord, a village and château in the department Loire-et-Cher, France, 12 miles E. of Blois. The château, one of the most magnificent structures in France, was begun by François I. (1526), and finished by Henri II., and has received many subsequent additions, containing now as many as 450 chambers. It was the temporary seat of the brilliant courts of Henri II., Louis XIII., and Louis XIV.; and a fête given here by the latter was the occasion on which Molière first performed his *Bourgeois Gentilhomme* in 1670. Napoleon I. bestowed C. on Marshal Berthier, and in 1821 it was bought by the Legitimist party and presented to the Duc de Bordeaux, who derives from it the title of Comte de C. (q. v.).

Cham'bre Ardente' was the name of a court established in 1535, in connection with an inquisitorial tribunal, by François I. Its function was the extirpation of heresy. It was famed for the severity of its punishments, the most common being, as its name would lead us to suppose, death by burning. It was very active under Henri II., whose entry into Paris in 1549 was signalised by a burning of heretics. In 1679 it was employed in investigating into the reports of poisoning cases which arose on the trial of the Marchioness Brinvilliers, after which time it does not appear to have ever again become active, and has long been abolished.

Chambre Introuva'ble (which may be translated 'Nonsuch Parliament'), was the ultra-royalist Chamber of Deputies which met on the second restoration of Louis XVIII. under the presidency of Lainé, and which, led by De la Bourdonnaye, De Villèle, and De Bonald, surprised everybody by its extreme reactionary policy. The Chamber acted as if resolved to stamp out the possibility of revolution, and had the services of men who afterwards occupied a very different position. Thus the bill to make more summary the jurisdiction of the Prevôtal courts was under the charge of Royer-Collard and Cuvier. A cruel law on sedition was also passed, but it was the famous debates on the amnesty question that most clearly showed the spirit of the implacable Right-hand Royalists, who opposed the Cabinet, and insisted upon extending the classes of exception from the amnesty, and upon the policy of confiscation and banishment of the regicides implicated in the Hundred Days. De Serre distinguished himself by moderate counsels in this debate. The leading clerical champions on the right hand were De Castelbajac (who had a bill to take all restrictions from mortmain), Lachèze, Murel (who wished the clergy to recover the custody of civil records), De St Romain (who attacked the lay character of the universities), De Bonald (who called for the abolition of divorce), and De Blangy (who opposed the continuance of official pensions to married priests). Then the outrages against Protestants broke out in the departments of the S.; Generals Ramal and Lagarde and Marshal Brune were murdered, and it required all the efforts of Pasquieu to secure a condemnation of the murderers in the local tribunals. It was no doubt the spirit of the Right-hand Royalists (as expressed in a pamphlet by De Vitrolles, replied to by Guizot) that made it impossible for the Government to pardon Marshal Ney. When the Chamber met after adjournment, it was decidedly unpopular. Its chiefs got such nicknames as Contractor for Burials, Gravedigger, Rattlesnake, Dispenser of Holy Water, &c. Accordingly, in spite of the pleading of Chateaubriand, in his *Monarchie selon la Charte*, the King dissolved it, 14th August 1816.

Chame'leon, a lizard genus belonging to the family *Chamæleontidæ*, and represented by the familiar *C. Africanus* of the N. of Africa and Egypt, so long celebrated for its power of altering the hue of its body when irritated or alarmed. The eye is large, and covered by a circular lid formed of the united two lids, and perforated in the centre for the admission of light to the pupil. The tongue is long and fleshy, and can be protruded with great celerity, so as to catch the insects upon which the C. feeds. The tail is rounded and prehensile. The body is compressed, and covered by small granules or scales, so as to resemble shagreen. The legs are well developed, the toes being situated so as to form two equal and opposable sets in each foot, and are thus adapted to aid the creature in its arboreal life. The lungs are of very large size. The C. is confined to the warmer regions of the eastern hemisphere, and is slow in its movements. Various species, besides the familiar one above noticed, are known, and of these, *C. Petersii* and *C. bifurcus*, or the large-naped C., are familiar forms. The latter occurs in Madagascar, India, &c., and is so named from the muzzle in the males being deeply cleft.



Chameleon.

These reptiles have long been celebrated for their power of changing the hues of their bodies. The usual colour of the C. is green, although in Britain it appears to alter to a yellowish or greenish grey. It may even range through the shades of green, blue, violet, and yellow—all of which are hues allied to green. The mode in which the change of hue is effected is similar to that seen in the *Cephalopoda* or cuttlefishes, and consists of colour-cells (*chromatophora*), which exist in the deep layer of the skin; and by altering the position of these cells, seen through the transparent upper skin, the characteristic colour changes are produced. The influence of light and of the nervous system have much to do with the changes of colour.

Chameleon Mineral is the name sometimes given to manganate of potash (K_2MnO_4) on account of the curious changes of colour which take place in its aqueous solution if left to itself. These changes in the tint of the solution are caused by the gradual decomposition of manganate of potash (solution of which is green) into permanganate of potash (solution of which is carmine coloured).

$$\underbrace{3(K_2MnO_4)}_{\text{Manganate of Potash.}} + \underbrace{2H^2O}_{\text{Water.}} = \underbrace{2KMnO_4}_{\text{Permanganate of Potash.}} + \underbrace{MnO_2}_{\text{Binoxide of Manganese.}} + \underbrace{4KHO}_{\text{Caustic Potash.}}$$



C. M. is readily obtained by fusing together equal weights of binoxide of manganese and caustic potash.

Cham'fering (Port. *chanfrar*, 'to slope or hollow'), cutting or paring off the edge of anything originally right-angled. If the new plane is besides rendered slightly concave, it is called a *hollow chamfer*. In Gothic architecture there are frequently ornamental terminations to a chamfered surface.

Cham'ier, Frederic, an English novelist of French extraction, was born in London in 1796, and died November 1, 1870. He may be described as an inferior Marryat, like whom he served in the navy before he began literary labour. He wrote many novels, some of which, such as *Ben Brace*, *The Arethusa*, *Tom Bowline*, *Jack Adams*, &c., have been very popular, both here and on the Continent, and a *Review of the French Revolution of* 1848.

Chamiss'o, Adelbert von, properly **Louis Charles Adelaide de Chamisso de Boncourt**, an eminent German lyric poet, was born, 27th January 1781, in the Castle of Boncourt, in Champagne. His family emigrated in 1790 to Prussia. C. was at first (1796) page to the Queen of Prussia, then served in the Prussian army, but as a Frenchman by birth would not fight against his former countrymen; took part in an expedition (1814) to discover the N.W. Passage, and finally obtained a situation in the Botanical Garden of Berlin, where he died, 21st August 1838. C. was great as a naturalist, but still greater as a poet. His *Gesammelte Werke* were published at Leipsic in 1836-39 (5th ed. 1864), and are marked both by humour and a romantic imagination. They embrace ballads, songs, &c. Humour is the chief characteristic of his popular fiction of *Peter Schlemihl* (7th ed. 1860), which is an amusing story of a man that loses his shadow. See Hitzig's *Biographie von C. nebst Briefwechsel*, edited by Kurz (2 vols. 1869).

Cham'ois (*Rupicapra Tragus*), a genus of Antelopes (q. v.), of goat-like conformation, inhabiting the precipitous steeps of the Alps, Pyrenees, and other European mountain ranges. The horns are peculiar in their conformation, rising straight from the top of the head for some inches, and curving suddenly backwards to form a pair of hook-like processes. The colour is a yellowish-brown on the upper parts, and lighter below, the spine or back ridge being marked by a black stripe. The winter fur is darker than the summer coat. The face is marked by a dark band of colour, which runs from each angle of the mouth to the eye, and around each eye forms a dark circle. The horns are of black colour, and have a polished appearance. When full-grown, these forms may average 2 feet in height, the horns being from 5 to 8 inches long. The food consists in summer of mountain herbs and grasses, and in winter of sprigs of fir, pine, and juniper trees. The flesh has a peculiar flavour, owing to the diet. The skin is largely employed in the manufacture of the well-known C.-leather, used for a variety of purposes in this



Chamois.

and other countries. The hind-legs are larger than the fore-limbs, and aid the C. in ascending steep cliffs, whilst the rudimentary hoofs placed on the back of the feet assist it in gaining a firm foothold in its perilous descents. These animals are very agile and wary. They are exceedingly acute and sensitive, both through the senses of sight and smell. They live in small herds, and on one member of the flock devolves the duty of watching for enemies, and of giving due alarm. C.-hunting is one of the most dangerous of Alpine pursuits.

Cham'omile. See CAMOMILE.

Cham'ond, St, a manufacturing town in the department of Loire, France, on the Jauon, 7 miles E.N.E. of St Etienne by railway. It has large iron-foundries, silk-factories, and works for the construction of steam-engines. Pop. (1872) 12,382. C. possesses the ruins of a château built by the Counts of Forez.

Cham'ouny or **Cham'onix**, also **Cham'onis** and **Cammuni'ta** (Lat. *Campus munitus*), a wild and beautiful vale in the department of Haute Savoie, France, about 13 miles long and 2 broad, lies far away from all high roads, at a height of 2150 feet above the Lake of Geneva. The village of C. on the Arve (pop. 2415) is much visited by tourists. From the vale of C. the ascent of Mont Blanc is usually made.

Champagne', a former province of France, was bounded N. by the Ardennes, E. by Lorraine, S. by Burgundy, and W. by the Isle de France and Picardy, and had an area of 9997 sq. miles, and a pop. of 1,238,720. It is in great part a plain, from 300 to 600 feet high, and is divided into a dry and wretched district in the N.E. (*C. Pouilleuse*), and the fertile region of the S.W., famous alike for the production of flints and of the wine to which the province gives name. Its capital was Troyes on the Seine. C. formed a part of ancient Gallia, conquered by Cæsar, and later fell into the hands of the Franks, but was ruled from the 11th c. by semi-independent counts. It was annexed to the French crown by the marriage of Philippe IV. with Joanna, heiress of Navarre, in 1284, and was incorporated formally by Philippe VI. in 1328. During the campaigns of 1792 and 1814, C. was the principal scene of the fighting. After the Revolution the province was split into the departments of Ardennes, Aube, Marne, and Haute-Marne, and parts of Aisne, Yonne, Seine-Marne, and Meuse. See Arbois de Jubainville's *Histoire des Ducs et des Comtes de C.* (5 vols. Par. 1859–63).

Champagne Wine, an effervescent wine, named from the district of France in which it is prepared. C. is chiefly manufactured from the same dark grape—the black *pineau*—used in making Burgundy, and is kept uncoloured by having the husks removed before the fermentation of the must or juice sets in. After the must has undergone the first fermentation, it is carefully clarified by isinglass mixed with a proportion of sugar, and in this state it is bottled up and fastened with wire as it comes into the market. It is then put to undergo a further fermentation in rooms having a rather high temperature, and the progress of the fermentation is marked by the liqueur assuming a ropy appearance, and by the occasional bursting of a bottle through the pressure of the carbonic acid gas which is generated. After the wine has again cleared itself the bottles are uncorked, and the yeast which has been made to collect under the cork is removed. A small quantity of sweetened liqueur is then added, varying in quantity according as the wine is desired 'sweet' or 'dry.' It is now corked, wired, covered with the tinfoil, and labelled, ready for the market. The most esteemed brands of C. are Veuve Clicquot, Moet et Chandon, Mumm, Roederer, and Heidsieck. There is very good reason to believe that a large proportion of wine sold as C. is spurious, and either prepared from fruit juices other than the grape, or by artificially aerating still white wines.

Cham'party, or Champerty (lit. *partnership; Fr. champ parti;* Lat. *campus partitus*, 'land shared or divided'), in English law, is a bargain with a plaintiff or defendant to share the land, debt, or other matter in dispute if he prevails at law, the *Champertor* agreeing to carry on the suit at his own cost. The contract is not only void in equity, but it is criminal. No one is permitted to assign any interest or contingent profit of a *matter in dispute*, or to enter into an agreement to share it with any one, on consideration of his recovering it and bearing the expenses. In *Strachan* v. *Branchi* a gift from an heir-at-law resident abroad, on the death of his ancestor, ignorant of his rights, to one who had given him information and supported him in recovering his rights, was set aside, as was also a bond for £2000, payable in the event of success, in consideration of £1000 advanced for carrying on the suit, Lord Roslyn observing that the transaction savoured of C. The analogous term in Scotch law is *Pactum de quota litis* (q. v. under PACTUM ILLICITUM).

Cham'pignon, the French name for mushrooms, but in Britain only applied to *Agaricus* (*Marasmius*) *Oreades*—the 'Scotch Bonnets'—which is one of the edible species.

Cham'pion (either Old Eng. *cempa*, 'a warrior'—compare Ger. *kämpfen*, 'to fight'—or the Lat. *campus*, 'a field'—*i.e.*, of battle), a man who, according to agreement, fights a public combat on his own or another person's account. Champions are mentioned as early as the reign of Charlemagne. In the early part of the middle ages the judicial combat was fought by a C. on behalf of women, children, aged and infirm persons, and also of ecclesiastics. It was a profession, and was not considered an honourable one. But later on in the ages of chivalry a knight who entered the lists on behalf of any one incapable of self-defence was called a C., and then the name began to carry with it more dignity. In England the ancient office of C. of the crown was held by the family of Dymocke from the twentieth year of the reign of Edward I. A member of this family appeared in Westminster Hall at every coronation in complete armour, and proclaimed, by herald, a challenge to wage battle with any man who should three times gainsay the title of the new monarch. This form was last gone through at the coronation of William IV. by Mr Henry Dymocke, at whose decease, without male heirs, the office became extinct.

Champlain', a lake between the states of New York and Vermont, with its northern extremity in the Dominion of Canada, named after Samuel C., who discovered it in 1609, and emptying itself into the St Lawrence by the Richelieu. It is about 120 miles long, and varies in breadth from ½ to 15 miles; is navigable for ships of 100 tons, and is connected at its southern extremity with the Hudson by a canal. C. abounds in salmon, shad, and other fish. The chief towns on its banks are Burlington on the E., Whitehall at the S., and Plattsburg on the W.

Champoll'ion, Jean François, surnamed **Le Jeune**, was born 23d December 1790, at Figeac (department of Lot). He showed great precocity in the acquisition of Oriental alphabets and in drawing medals. His first idea was to reconstruct the geography of Egypt under the Pharaohs, by collecting the names of districts and towns found in Greek and Latin authors, and by detecting the Coptic element in such names as had been overlaid by Hebrew and Arabic. In 1807 he made at Paris the acquaintance of Milan, De Sacy, and Van Præt, and got access at the College of France to the valuable Coptic manuscripts which had been taken from the congregation of the Propaganda at Rome. He worked at a Coptic grammar and a dictionary, which he believed would give a key to the hieroglyphics, and in 1808 by a comparison with a demotic or enchorial papyrus, he identified in the Rosetta inscription the twenty-five letters mentioned by Plutarch. Next year C. became Professor of History at the new University of Grenoble. In 1814 appeared *L'Egypte sous les Pharaons* (2 vols.), the geographical-descriptive part of a work in which he intended to treat of all Egyptian civilisation. After the second Restoration he added Geography to his chair. In 1822 he read at Paris the brilliant essays on the Demotic and the Hieratic writing, maintaining that the latter was a shorthand equivalent of the full hieroglyphic, and his letter to M. Dacier on the phonetic hieroglyphics used in the inscription on Egyptian monuments of the titles, the names, and surnames of the Greek and Roman sovereigns. In the latter he claimed to have deciphered the names Ptolemy, Alexander, Berenice, Arsinœ, Cleopatra, and the word *autocrator*. In 1824 appeared his chief work, *Précis du Système Hiéroglyphique*, which is accompanied by a volume of plates and explanations of the three elements into which he resolved Egyptian writing—the figurative, the ideographic, and the alphabetic. C. afterwards visited, and in various forms wrote upon, the Drovetti collection at Turin, the Salb collection at Leghorn, the papyri in the Vatican Library, and the royal collections

of Florence and Naples. In the first he deciphered the royal chronological papyrus; in the second, a basso-relievo representing the infancy of Sesostris. On his return to France he became keeper of the new Egyptian Museum of the Louvre, in which he lectured on Egyptian archæology. This course was afterwards transferred to the College of France. Charles X. sent C. with a staff of draughtsmen to Egypt and Nubia, the result of which was a valuable collection of classified drawings of the monuments. An essay in 1831 on the notation of time in Egypt was followed by the *Grammaire Egyptienne, ou Principes Généraux de l'Écriture Sacrée Egyptienne, appliquée à la Représentation de la Langue parlée*, not published till 1836. He had only finished the prospectus of a great work on the industry, religion, government, and astronomy of Egypt, when death came, at Paris, 4th March 1832. His manuscripts were thought of so much importance that they were acquired by the state by a special law; most of them, including the *Grammaire Egyptienne*, being subsequently published by his brother.—**Jean-Jacques Champollion-Figeac**, the elder brother of the preceding, born at Figeac in 1778, was librarian and Professor of Greek at Grenoble, and latterly held the post of librarian to Napoleon III. He has written largely on French and other antiquities. We may mention his *Nouvelles Récherches sur les Patois ou Idiomes Vulgaires de la France* (1809); *Annales des Lagides, ou Chronologie des Rois Grecs d'Égypte, Successeurs d'Alexandre le Grand* (2 vols. 1819,); *Traité élémentaire d'Archéologie* (1843); *Traité élémentaire de Chronologie* (1843); the historical and descriptive part of Silvestre's *Paleographie Universelle* (1839–41); *L'Egypte Ancienne et Moderne*, 1840 (in the *Univers Pittoresque*); editions of mediæval charters and fragments.—**Aime Champollion-Figeac**, son of the preceding, has edited several important historical works, such as the Memoirs of Turenne, Francis of Guise, Omer Talon, and Cardinal de Retz. He has also written *Le Cardinal de Retz après la Fronde* (1843).

Chanak-Kalessi ('Pot Castle'), or **Kale Sultanieh**, a town of Turkey in Asia, vilayet of Brussa, 116 miles W. of Brussa, has a strong castle which commands the Dardanelles. It is named from this castle and from its manufacture of pottery. Pop. 4000.

Chance may be fairly defined as a term which we use to denote the operation of cause of which we are ignorant. Thus, it would be said that the tides ebb and flow according to law, but that it is an affair of C. whether a given future day be a rainy or a dry one. This simply means that in the former case we know the cause, and can calculate on its operation; and that in the latter case we do not know the cause, and cannot calculate on its operation. But religion and science unite in teaching us that every event has a cause, although it may lie beyond the scope of human vision; and, therefore, that the power which regulates the weather is just as fixed in its operation as that which regulates the tides. Religion excludes the idea—if the idea be possible—of effect without cause, as inconsistent with belief in Divine government; while science demonstrates that, in effects produced by causes of which we are ignorant, there is, nevertheless, a regularity of result which proves the existence of cause, and not unfrequently leads to the discovery of it: thus, we find that the marriage-rate in England in the lower classes, in a given year, may be almost absolutely predicted from the price of wheat during that year. 'The marriages again,' says the Registrar-General (34th Report), 'by a natural law determine the birth-rate, which in its turn becomes one of the factors that in combination determine the death-rate; and thus the sequence of events by which the life of communities is sustained completes itself.' When there are conflicting forces bearing on the determination of an event, their relative force expresses itself according to a law called the Law of Probability. See PROBABILITY, LAW OF.

Chan'cel (Lat. *cancelli*, 'railings, a lattice'), the eastern division of a church, separated generally from the nave by an arch with steps, and sometimes screened off with lattice-work, which prevents intrusion by the people, but does not hinder either seeing or hearing. The rector or vicar has the freehold in the C., and it is his duty to keep it in repair. No monument can be set up in the C. without the consent of the ordinary incumbent.

Chancellor (Lat. *cancellarius*) was originally the notary or secretary of the Roman emperor, and received his name either because he was empowered to *cancel* or cross out expressions in the imperial edicts, or because he sat with his master *intra cancellos*, within the latticed railings that prevented the emperor from being crowded by the people while administering justice. There is an officer of state bearing this title in most European countries; but the duties and powers of the office vary. Formerly there was a C. of France, whose functions were almost equally important with those now exercised by the C. of England. The office was abolished at the Revolution, and, though subsequently revived, many of its duties were transferred to the Minister of Justice, who continues to discharge them. In the Church of Rome each bishop has his C.

Chancellor, Lord.—The L. C. of England is the highest temporal officer under the crown. He is the confidential adviser of the sovereign in state affairs, and is called the 'keeper of the king's conscience.' He is appointed to office by the delivery of the great seal into his custody. He is a privy councillor *ex officio*, and Speaker of the House of Lords by prescription. He has the appointment of all the justices of the peace throughout the kingdom. In England he is the guardian of all infants, idiots, and lunatics, and has the general superintendence of all charitable institutions. In his judicial capacity he exercises the very extensive jurisdiction of the division of the supreme Court of Chancery. (See CHANCERY, COURT OF.) All patents, commissions, warrants, &c., from the crown are examined by the C. before being signed. The salary of the office is £10,000 a year, with an annuity of £5000 on retirement. For many centuries the chancellors, like most state functionaries, were ecclesiastics, and an office so confidential could not fail to grow in importance, so that the king's clerk gradually enlarged his powers, and from chief scribe and reader became the confidential adviser of his sovereign. From having merely to affix the king's seal to judicial writs or mandates, he became a powerful judge, sitting in the *Aulior Regia* as its chief legal director, or in the marble chair of Westminster Hall, with a great marble table before him, covered with the writs and charters waiting to be sealed in his presence with the great seal of England.

Chancellor of a Cathedral is an officer who superintends arrangements for the celebration of religious service.

Chancellor of a Diocese is an officer who advises the bishop in questions of civil law. He must at least have the university degree of Master of Arts. He may hear certain cases on behalf of the bishop, but in some cases the bishop must sit in person.

Chancellor of an University is usually the highest officer connected with an university. See UNIVERSITY.

Chancellor of Scotland.—This office was abolished at the union with England in 1707. The C. of S. was an officer of very great importance. He presided in the Scotch Parliament and in all courts of judicature, and had direction of the Chancery. (See CHANCERY or CHANCELLARY.) He had the custody of the Great Seal (q. v.), and was chief counsellor to the king, taking precedence of all others *ratione officii*. On the abolition of the office, a keeper of the great seal was appointed, who acts ministerially in affixing the seal to the writs passing under it. The last C. of S. was the Earl of Seafield, who held the office at the Union. The first was Constantine, Earl of Fife, in the reign of Alexander I.

Chancellor of the Exchequer. See EXCHEQUER.

Chance Medley, and **Chand Medley** or **Mellé**, are legal expressions borrowed from the French. The former means a casual affray, the latter an affray in passion. They are admitted as pleas in mitigation of the offence of Homicide (q. v.).

Chan'cery. In former times the office or chamber in which the Chancellor (q. v.) performed his functions was called the C. It was generally divided by lattice-work (*cancelli*), the outer half for the accommodation of the people, the inner for the accommodation of the Chancellor and subordinate officers.

Chancery or Chancellary of Scotland is an office in the General Register House of Edinburgh, managed by the Director of C. and his deputies. In it are recorded charters, patents of dignities, gifts of office, remissions, legitimations appointed to pass the great or the quarter seal. All writs passing through C. are recorded before they are given out to be sealed.

Chancery, Court of, is in England the division of the Supreme Court next to the House of Lords in jurisdiction. This is either *ordinary* or *extraordinary*: in the first, procedure is according to common law; in the last, it may by equity abate the rigour of the common law, and afford a remedy to which common law is

inadequate; but when that is adequate, the C. of C. will not interfere. It will not entertain a suit for any amount under £10, except in case of charity. Several modern statutes have been passed affecting the C. of C., but the general orders still chiefly guide its practice. These were consolidated in 1860, and the regulations as to fees and charges condensed and arranged in one volume under the auspices of Lord Chelmsford. Alterations and additions have since been made, especially by the Supreme Courts of Judicature Acts of 1873 and 1875. The Lord Chancellor is the highest judicial officer in the kingdom. He is a privy councillor by his office, and Speaker of the House of Lords by prescription. Assistant to and subordinate to the Lord Chancellor are the Master of the Rolls and three Vice-Chancellors. Each of the judges presides over a separate tribunal, and any cause or motion may be brought before them, except such as relate to lunatics, which are always heard by the Lord Chancellor. Those interested in questions cognisable by the C. of C. are now empowered to state special cases for the opinion of the court, by which means the expense and delay of a lawsuit may be prevented.

Chandairee', a town in the state of Gwalior, Central India, 100 miles N. of Bhopal, near the river Betwa, has a strong fort and extensive ruins of caravanserais and mosques. It was formerly a place of importance, became infested with freebooters under Mahratta rule, and was brought under British control by the treaty of 1844. Pop. 8000.

Chandernagore', a town and petty territory (2330 acres), belonging to France, within the province of Bengal, and on the left bank of the Hoogly. The town is 21 miles N. of Calcutta by railway, and has a pop. of some 30,000, who are mainly natives. Its trade, which was at one time little inferior to that of Calcutta, has been greatly injured by the silting up of the river. Founded by the French in 1676, C. was captured by Clive in 1757, but restored in 1763; again taken by the British in 1793, and once more restored in 1816.

Chand'ler, Dr Richard, a learned English antiquary, born in Hampshire in 1738, and educated at Magdalen College, Oxford, first distinguished himself by the publication in 1763 of *Marmora Oxoniensia*. Next year he was sent by the Dilettanti Society to make observations in Greece and Asia Minor, the result of which appeared in his *Ionian Antiquities* (1769). In 1773 he was presented to the living of Worldham in Hampshire, and afterwards to that of Tilehurst in Berks. In 1774 he published *Inscriptiones Antiquæ pleræque nondum editæ, in Asia Minore et Græcia præsertim Athenis collectæ*, and in 1775–76 his *Travels* in these countries. His *Life of William of Waynflete* was not published till after his death, which took place at Tilehurst, 9th February 1810.

Chandore', a town in the district of Ahmednuggar, province of Bombay, British India, 150 miles N.E. of Bombay. It is defended by a strong hill-fort, and has some slight trade. Pop. about 8000. It originally belonged to Holkar, but capitulated to the British in 1804, was temporarily restored, and finally ceded to Britain in 1818.

Chand'os Clause is the name given, from its being originally proposed in 1831 by the Marquis of Chandos, afterwards Duke of Buckingham, to a clause in the Reform Act of 1832, which gave the county franchise to tenants-at-will paying a rent of £50 a year. Although strongly opposed on the ground that it would place county elections at the mercy of landowners, it was ultimately carried by 272 to 32 votes. Under the latest Reform Act, that of 1867, occupants of lands of a rateable value of £12 a year are entitled to the county franchise.

Chandpore, a town in the district of Bijnour, N.W. Province, British India, 80 miles N.E. of Delhi, in a hilly country. Pop. (1872) 11,286.

Changar'nier, Nicolas Anne Théodule, a French general, was born at Autun, April 26, 1793. Entering the army, he distinguished himself so much in Algeria, that, in 1848, he took Cavaignac's place as Governor-General. He subsequently commanded the garrisons and National Guard of Paris during the revolutionary excesses of 1848 and 1849, and suppressed the insurrectionary movements of the time. He was, however, opposed to the ambitious schemes of Prince Louis Napoleon, and was in consequence imprisoned after the *coup d'état* of December 2, 1851. Under the Third Empire he lived in exile till the Franco-German war of 1870, when he fought for his country, and was imprisoned with Marshal Bazaine in Metz. After peace was made he returned to France, aided in the reorganisation of the French army, and was elected a senator in the new French Assembly of 1876, created by the republican constitution of the previous year. He died at Paris, 14th February 1877.

Change'ling, a term applied, during the belief in elves and fairies, to a weakly child, peevish, and backward in walking and speaking, which was supposed to be an elf substituted by fairies for the fine infant that had been born. According to this belief, the substitution could only take place before the child was christened, and hence it was carefully watched till that rite was performed.

Chan'gi, the juice of *Coriaria thymifolia*, of a reddish colour, but which in a few hours after exposure turns black. In S. America, during the Spanish *régime*, state documents were written with it. It is said that it does not corrode steel pens, and that the writing made with it is more indelible than that with ordinary artificially-made ink.

Chann'el, English. See ENGLISH CHANNEL.

Channel Islands, a well-known group in the English Channel, of which the principal members are Jersey, Guernsey Alderney, and Sark, described under their respective names. They lie about 80 miles S. of the English coast, and some 10 miles W. of the peninsula of Cotentin in Normandy, with a total area of 112 sq. miles, and a pop. (1871) of 90,596. The C. I. have belonged to England since the Conquest, and are now all that remain to it of the Dukedom of Normandy. See Professor Ansted and R. G. Latham, *The C. I.* (1862).

Chann'ing, William Ellery, was born at Newport, Rhode Island, U.S., April 7, 1780. His father was an extensive merchant. He graduated at Harvard College in 1798, and after acting as a private tutor in Virginia, became minister of a Congregational church in Boston. At first he was allied with no theological party, though afterwards he became a zealous Unitarian. C. was a very popular preacher, and gained wide reputation by his sermons, which were published in 1812. He was made D.D. in 1820, and in 1822 visited England and the Continent. During his later years he devoted himself to criticism and discussion of social questions, proving himself an earnest advocate of social reforms and negro emancipation. He died at Bennington, Vermont, October 2, 1842. He was sincere, pious, and pure-spirited. Coleridge said he had 'the love of wisdom and the wisdom of love.' His Unitarianism was deeply coloured by scriptural sentiment. It was quite distinct from the Rationalism of Parker, and had not even much in common with the system of Priestley. C.'s works—of which the chief are *Essay on National Literature* (1823), *Remarks on the Character and Writings of John Milton* (1826), *Character and Writings of Fénélon* (1829), *Negro Slavery* (1835), *Self-Culture* (1838)—though seldom profound or moving, are marked by earnestness of tone, judiciousness, and elegance of style. See *Memoir of C.*, by his nephew, W. H. Channing (3 vols. 12mo, Bost. 1848; 2 vols. Lond. 1850).

Chantill'y, a town in the department Oise, France, on the Nonette, 23 miles N.N.E. of Paris by railway. It has a famous racecourse, and is noted for its industry in black lace. Pop. (1872) 3335. Anne de Montmorency built here a splendid château, where the great Condé spent the decline of his life, in the occasional society of Boileau, Bossuet, Racine, and Molière. The building was partly destroyed on the outbreak of the Revolution of 1793. It is surrounded by a finely wooded park of 6700 acres.

Chan'trey, Sir Francis, an eminent English sculptor, born at Jordanthorpe, Derbyshire, 7th April 1781, was the son of a carpenter, and at the age of sixteen was apprenticed to a carver and gilder. He early showed a distinctive ability in drawing and modelling, went to London in the beginning of the century, commenced to study at the Royal Academy (of which he became a member in 1818), and exhibited a bust in 1805 which won the high approbation of Nollekens. He established his fame by his colossal busts of Howe, St Vincent, Duncan, and Nelson, for Trinity House and Greenwich Hospital. He modelled an immense number of busts, including those of most of the celebri-

ties of his time, and among his best-known statues are those of George IV. in Edinburgh, Brighton, and London, and the Duke of Wellington in front of the Royal Exchange, London. His conceptions were seldom ideal—never poetic. Truth, expression full of character, and conventional but always graceful drapery are the characteristics of his busts. He was knighted in 1837, and died 25th November 1841, leaving a fortune of £100,000, to be retained for the use of Lady C. during her lifetime, and after that event to be remitted to the Council of the Royal Academy, who were empowered to use the interest of that sum—less a few small annuities—'for the promotion of British art.' Lady C. died 3d January 1875, and the interest of C.'s fortune, amounting to about £3000 a year, is now received by the Royal Academy, to be expended, according to the wish of the testator, in the purchase of the best works in sculpture or painting executed in Great Britain. See Holland's *Memorials of Sir Francis C.* (Lond. 1851), and Jones's *Recollections of the Life of C.* (Lond. 1849).

Chan'try (Fr. *chanterie*, from *chanter*, 'to sing'), a term applied both to the office or benefice which provided for the chanting of masses for the souls of the founder and his friends, and also to the little chapel in or attached to the cathedral or parish church in which the masses were performed. The tomb of the donor was generally erected in the middle of a C., and the endowments were either in lands or revenues. The emoluments derived from the office of chanting-priest in these little chapels were eagerly sought after, as may be inferred from Chaucer's beautiful sketch of the 'Pore Persoun,' in the prologue to the *Canterbury Tales*:—

'He sette not his benefice to huyre,
And lefte his scheep encombred in the myre;
And ran to Londone, unto seynte Poules,
To seeken him a chaunterie for soules.'

Chanteries were dissolved by Henry VIII., and his decree was confirmed by Act of Parliament, 1 Edward VI. c. 14.

Cha'os (from a Gr. verb signifying to yawn or gape), that vacant immeasurable space antecedent to the creation of the world, out of which, according to the ancient cosmogonies, gods, men, and all things sprang. Hesiod makes C. the mother of Erebus and Nox. It is generally conceived of as implying confusion and disorder, and as the opposite of *kosmos*.

Chaos Islands, a small group of islets at the mouth of Algoa Bay, S. coast of Africa, 35 miles E. of Port Elizabeth.

Chap'books, so called because sold by the Chapman (q. v.), a homely kind of literature, once extremely popular, and forming almost the sole reading of the humbler classes, especially in the rural districts. They are now very scarce, and are eagerly sought after by the bibliomaniac. The volumes of the more recent C. generally consisted each of a twenty-four page single sheet, price one penny, and were illustrated by one or more execrable woodcuts. Most of them were what would now be deemed offensively coarse, and even gross; but allowance must be made for the altered condition of society, and for the change in the public taste. Consequently such of them as are still republished are excised and expurgated till their character and spirit have evaporated. The older C. were printed in black-letter, and their contents were of a miscellaneous character, consisting of songs, ballads, wonderful tales, dream-books, &c. Some account of them may be found in *Notices of Fugitive Tracts and C.*, and in *Descriptive Notices of Popular English Histories*, by J. O. Halliwell. A similar service was rendered to French literature of this class in 1854 by M. Charles Nizard in his *Histoire de la Littérature du Colportage*, and Mr John Fraser has partially carried out a design long contemplated by the late William Motherwell, by publishing at New York in 1873 two parts of *The Humorous C. of Scotland*, in which some account is given of the more popular brochures, and of Dugald Graham, bellman or town-crier of Glasgow, who wrote, either in whole or in part, many of the best of these. His *History of the Rebellion of* 1745, first published as a chapbook, was an especial favourite with Sir Walter Scott.

Chapa'la Lake, the largest Mexican lake, lies on the table-land of Anahuac, in the province of Michoacan, has an area of about 1300 sq. miles, and is studded with numerous islands. It empties into the Pacific by the Rio Grande or Rio Santiago, of which it is only an expansion.

Chapel (Fr. *chapelle*, Low Lat. *capella*; originally the place in which was preserved the *cappa* or cope of St Martin, but after the 7th c. applied to any sanctuary containing any relics), came to signify a separate erection attached to a church or cathedral, a domestic oratory, and also a place of worship for a corporate body, such as a university C. The name is now generally applied to a place of worship built apart from the parish church, such as chapels of ease or dissenting chapels. The word also denotes the ecclesiastical staff of a sovereign, the divine office when recited by the Pope with the clergy of his household, and the working staff of a printing-office, the last meaning being a relic of the first printing-office in England, which was set up by Caxton in Westminster Abbey.

Chapelle, the name of six small towns of France, of which the principal are—1. **C.-sur-Erdre**, in the department Loire-Inférieure, with well-known mineral springs, and a pop. (1872) of 2610.—2. **C.-de-Guinchay**, department of Saône-et-Loire, has a trade in wine, timber, and cattle. Pop. 2130.—3. **La-C.-la-Reine**, in the department Seine-et-Marne, 37 miles S.E. of Paris, near Fontainebleau, has a church of the 15th c., and a pop. (1872) of 757.

Chapelle de Fer. See HELMET.

Chap'eron (Fr. *chaperon*, 'a hood,' a dim. of *chape*, from Lat. *caput*, 'the head'), a cap worn by Knights of the Garter, by doctors, and by licentiates of colleges. The term C. is also applied to the guide or protector of a lady at public places, and to ornamental devices placed on the heads of horses at funerals.

Chap'lain (Fr. *chapelain*, from *chapelle*), an ecclesiastic who performs divine service in a chapel, as at court, in the household of a noble, in a jail, a lunatic asylum, the army, or the navy. There are forty-eight court chaplains in England, four of whom are in attendance each month. In Scotland there are six clergymen called Deans of the Chapel Royal; but their only official duty is to offer up prayer at the election of representative peers for Scotland. A statute of Henry VIII. regulates the number of chaplains allowed to different grades of the nobility—eight to an archbishop, six to a duke, three to a baron. The name C. is sometimes given to members of cathedral and collegiate churches, especially to the non-capitular assistants of the canons. The office of *army-C.* used to be filled only by clergymen of the Church of England, but now Roman Catholics and Presbyterians have clergymen of their own persuasion appointed by Government to attend to their spiritual wants. The army-C. belongs not to a regiment, but to a brigade, or other group of regiments. He is attached to a military station at home, in the field to headquarters, the hospitals, or is with his brigade. The *C.-General* is the head of all the chaplains in the army. His office is a department of the War-Office, he assists in selecting chaplains, and in regulating religious matters in the army. There are at present about eighty army-chaplains, besides assistant-clergymen and chapel-clerks. The *navy-C.* performs divine service on shipboard, visits the sailors when they are sick, and attends generally to the morals of the crew. Every ship in commission down to fifth-rates has a C. The superior officers are instructed to be observant of the conduct of both army and navy chaplains, and also to see that the men pay them all the respect that is due to their sacred office.

Chap'let (Fr. *chapelet*, a dim. of *chape*), a headband or garland of entwined leaves and flowers. The C., in heraldry, is generally composed of four roses and leaves. A C. of rue is blazoned bendwise on the shield of Saxony.

Chap'man (Old Eng. *ceapman*; comp. Ger. *Kauffman*), the cheapening, bargaining man, or trader, applied originally to every kind of merchant, whether buyer or seller, but now restricted to itinerant dealers in smallwares, broadsides, single-sheet literature, &c. The C. used to be a prominent figure at Scottish fairs, the conclusion of which was marked by his disappearing from the scene—

'When *chapman* billies leave the streets,' &c.
—BURNS's *Tam o' Shanter*.

Chapman, George, was born in 1557 or 1559, near Hitchin in Hertfordshire, and studied at Oxford and perhaps at Cambridge. Almost nothing is known of his life. He died in 1634. He was a prolific dramatist and translator. His comedies, *The*

Blind Beggar of Alexandria, A Humorous Day's Mirth, All Fools, Monsieur d'Olive, The Gentleman Usher, May-Day, The Widow's Tears, display genuine comic invention, and resemble Jonson's plays in the exhibition of 'humours,' the frequent practical jokes, and the general absence of romantic sentiments. His tragedies, *Bussy d'Ambois, Revenge of Bussy d'Ambois, Biron's Conspiracy, Biron's Tragedy, Cæsar and Pompey, Alphonsus, Chabot, Revenge for Honour*, notwithstanding occasional turgidity and pedantic quaintness, contain much genuine passion and lofty eloquence. *Eastward Hoe*, a comedy which he wrote along with Jonson and Marston, is a brilliant and entertaining picture of old London life. C. is best known for his translation of Homer (1598-1615). It is full of fire and energy, and its fourteen-syllable verse has a grand, sonorous roll, but it loses the Homeric simplicity and grace through its prevailing Elizabethan mannerisms. Among C.'s other works are translations of *Hesiod's Georgics* and the so-called *Homeric Hymns*, a continuation of Marlowe's *Hero and Leander*, and *The Shadow of Night* and *Ovid's Banquet of Sense*—poems marked by extreme descriptive minuteness. The best edition of C. is in 3 vols. (Chatto & Windus), with an elaborate introduction by Swinburne. See also Ward's *English Dramatic Literature*, vol. ii. (Lond. 1875).

Chapped Hands are generally caused by imperfect drying after being washed, by the use of some irritating substance, or by cold. The treatment consists in avoiding the cause, using glycerine soap and zinc or borax ointment.

Chap'ter. See DEAN, DEAN AND CHAPTER.

Chapter (Fr. *chapitre*, old Fr. *chapitle*, from Lat. *capitulum*, a dim. of *caput*, 'the head'), the society of canons and prebendaries in a cathedral, of which the dean is the head, and which forms the council of the bishop. Prior to the time of Henry VIII., the election of a bishop rested with this body; but now its power is merely nominal in England.

Chapter-House, the apartment attached to a cathedral or collegiate church in which the heads of the Chapter (q. v.) meet to transact business. (See CATHEDRAL.) The C.-H. is frequently adorned with elaborate architecture, as, for example, at York, Wells, Salisbury and Lincoln; it is of various forms, but is pretty frequently polygonal, with a central shaft supporting the roof. It used often to be employed as a burying-place; those at Westminster and Wells have crypts under them.

Chara'ceæ, a small natural order of Cryptogamous plants, allied to the *Algæ* (q. v.), consisting of two or three genera, all the species being aquatic, and found in almost all parts of the world, but chiefly in temperate countries. In the cells the phenomenon called *Gyration* (q. v.) is seen. *Nitella* and *Chara* are the two best-established genera. Many of the species have their stems encrusted with calcareous particles. There are a number of species found fossil in the later Tertiary beds.

Characin'idæ. See SALMONIDÆ.

Char'acter, from the Gr. *charaktēr*, primarily denoted an instrument for marking, then the mark itself, and lastly the distinctive nature of any object by which it is separated from all others. It may be physical or moral, in either case being produced by appropriate agencies, and of both classes there are three species, essential, accidental, and relative. In the fine arts, the C. imparted to the work by the idiosyncrasy of the artist may be called its *subjective* C., and that which suits it for the end contemplated, its *objective* C.

Character, to servant.—A master (or mistress) is not bound either by English or Scotch law to give a servant a C.; but if he do give a C. it must be given without malice, otherwise the servant will have ground for an action for damage. On the other hand, wilfully giving a false C. in favour of a servant may render the giver liable in damage to any one injured by the deception. A small act of dishonesty will not warrant a master or mistress in branding a servant as a *thief*. Terms denoting criminality should be avoided; and if a criminal act is charged against the servant, care must be taken that proof can be given. When a servant merits a decidedly bad C., perhaps the safest and most effective course is to refuse to give any. A servant producing a forged certificate, or altering a certificate of C., is liable by statute to a fine of £20.

Charade' (a word of Provençal origin, passed into standard French as late as the 18th c.) denotes a species of riddle or syllable-puzzle—*silbenräthsel*, as the Germans call it—in which a word consisting of several syllables is indicated, first by an enigmatical description of each separate syllable, and then by a similar description of the whole word. The puzzle for the reader or hearer is to solve the riddle by telling the word so described. Wit and point are always aimed at in a good C., like the French one on *chiendent*, 'dog's grass,' which is: 'My first makes use of my second to eat up my whole.' Instead of being spelt, the C. is sometimes acted, and this has given rise to the *acting C.*, in which a scene representing each syllable is enacted by several members of a company, and during it the syllable is used as a word; so with the syllables put together, when a scene representing the whole word is gone through, and the word itself is audibly pronounced. The persons who take part in an acting C. must not be too self-conscious, must have some little power of mimicry, and a ready flow of talk.

Charadri'adæ, a family of *Grallatorial* or wading-birds, including several sub-families, of which the best known is that of the *Charadrinæ*, or true plovers and lapwings. The members of this family possess a straight, short bill, the apex of which may be strong and arched. The nostrils are placed in a groove running along the sides of the bill. The legs are long and slender, the toes being small, whilst the front toes are united at the base by a membrane. The hinder toe is small, rudimentary, and raised off the ground. The oyster-catchers, turnstones, pratincoles, coursers, &c., are also included in this family.

Char'bon Roux, the French designation of imperfectly charred wood of a deep-brown or russet colour—the *brown charcoal* of English metallurgists—which is well adapted for the manufacture of gunpowder for sporting purposes. It is prepared by forcing hot gases into a closed chamber containing piled billets of wood. Violette gives the percentage composition of a yellowish red variety (*très-roux*) as follows:—Carbon, 70·45; hydrogen, 4·64; oxygen and nitrogen, 24·06; ash, 0·85.

Char'coal. The fixed residue of the decomposition by heat of vegetable and animal products, rich in carbon. See CARBON, WOOD C., BONE BLACK, LAMP BLACK, CHARBON ROUX, &c.

Charcoal, in medicine. See CARBON, in medicine.

Chards, the late summer-blanched leaves of the artichoke.

Charente', a western department of France, part of the old province of Angoumois, has an area of 2200 sq. miles, and a pop. (1872) of 367,520. It mainly consists of the basin of the river C., which is confined by a low range of hills in the S. and by a continuation of the mountains of Auvergne in the N.E. Beyond the former of these ranges C. is watered by the Dronne, an affluent of the Dordogne, and to the W. of the latter by the Vienne, a tributary of the Loire. It has a mild and equable climate. The surface is in great part chalky, and the principal minerals are granite, iron, antimony, and limestone. In various parts occur vast chestnut forests, while the district of Champagne is famed for the production of the red wines *Saint-Saturnin* and *Asnières*. The arrondissement of Cognac gives name to a well-known brandy. Among the chief occupations are the cultivation of cereals, and the rearing of cattle for the Paris markets. There are extensive distilleries, iron-foundries, paper and cloth factories, tanneries, and potteries. C. is traversed by the Paris and Bordeaux Railway. Angoulême is the capital, and among the other towns are Cognac, Barbezieux, and Confolens.

The *river C.* rises in Haute-Vienne, enters the department in the E., and after a sinuous course, flows W. through C.-Inférieure, and falls into the Atlantic. It is about 200 miles long, has numerous affluents, several of which are liable to inundations, and is navigable to within a few miles of Angoulême.

Charente-Inférieure, a department of France, on the Bay of Biscay, between La Vendée and the Gironde, has an area of 2740 sq. miles, and a pop. (1872) of 465,653. It is hilly in the S., but the rest of the surface is singularly flat, while the coast-line is greatly indented, and has a length of over 100 miles. The principal rivers are the Charente, Seudre, and Curé. Among the products are wine, hemp, flax, beetroot, and saffron. The wine, which is partly converted into brandy, yields 15,000,000 francs yearly. There are extensive manufactures of lace, woollens, leather, machinery, glass, bricks, &c., and numerous distilleries and sugar-refineries. Salt is found in great quantity in the

marshes and lagunes, and a large number of boats are employed in the oyster and sardine fisheries. La Rochelle is the capital, and Rochefort is one of the best harbours. The department is connected with the Paris and Bordeaux Railway by a branch line. Off the coast there are several islands, of which by far the largest are St Martin de Ré and St Pierre.

Charen'ton, a town of France, department Cher, is situated on the Marmande, in a rich mining district, and has large iron-works. Pop. (1872) 1760.—**C.-le-Pont**, in the department Seine, 1½ miles beyond the fortifications of Paris, in a south-easterly direction from the city, on the right bank of the Marne, where it joins the Seine. It has manufactures of lace, artificial flowers, bijouterie, &c. The Marne is here crossed by the bridge of the Lyon Railway, and by a new stone bridge, at the S. end of which is the Alfort fortress. Pop. (1872) 6690.

Charge (Sp. *cargar*, 'to load;' Ital. *caricare*, from Lat. *carricare*, used by St Jerome for 'to load'), in gunnery, is the quantity of gunpowder requisite for one discharge. There are certain charges fixed for all guns, called *service charges*, and the aim is to make them such as will give the greatest initial velocity to the projectile, without unduly straining the gun. The service C. for a heavy and medium smooth-bored gun is one-third of the weight of the projectile; for light smooth-bored guns, one-fourth. The charges are smaller in firing with red-hot shot, and in ricochet firing. Rifled guns, on account of the absence of windage, and the longer time the shot is in the bore, and the consequent greater strain exerted by the gas, require smaller charges than smooth bores. The C. for an Armstrong breech-loading gun is only one-eighth the weight of the projectile. In the navy there is the *distant*, the *full*, and the *reduced* C.

Charge, in the law of Scotland, is the command of the sovereign by letter to perform some act. The term is also applied to the messenger's copy for service requiring the person to obey the order of the letter.

Charge, in heraldry, is any heraldic figure or device. A shield, banner, or any other field, is said to be *charged* or *chargé* when such device or figure is blazoned on it. The shield of the head of a house has nearly always fewer charges than that of a collateral branch or of a junior member of the family. But charges in a shield should always be as few as is consistent with a clear and vividly expressed meaning.

Charge' d'Affaires is an inferior diplomatic agent, accredited not to a court but only to the Minister of Foreign Affairs, and holding his credentials from the same official in his own country.

Char'ger, a name formerly given to a horse employed in battle (hence its name), but now applied only by imaginative writers to the animal prosaically called a cavalry-horse. In the middle ages, the war-horse was nearly altogether encased in defensive armour, or *barded*. A *chanfron* protected the entire head; *crinières*, the neck; a *poitrinal*, the breast; and *croupières*, the buttocks and haunches. These pieces of armour were generally made of metal, but sometimes of leather. Occasionally the horse was covered with chain-mail; and sometimes there was a gambison of stuffed or quilted cloth under the armour.

Charities, Law as to. In England, the sovereign, as *parens patriæ*, is the guardian of all charities, and the Attorney-General may take legal proceedings to restore any abused or dilapidated foundations. Means are provided by statute for securing a due administration in certain cases of *charitable trusts*, and for the beneficial application of charitable funds, by empowering the crown to appoint four commissioners, one secretary, and two inspectors for these purposes. Reservation is made of the rights of the Church of England, and the Act does not extend to the universities or to charities partly supported by voluntary contribution.

Charity Commissioners, a body created by Act of Parliament in 1853 to inquire into the working of charities in England and Wales. The scope of inquiry does not embrace Scotland nor Ireland, nor the English universities, nor London.

Charivar'i is a French word now chiefly applied to a satirical newspaper of the type of *Punch*, which ridicules public men, and especially politicians, such as *Le Charivari*, established in Paris in the end of 1832. Originally C., the etymology of which is doubtful, meant a hubbub of noises produced by whistling, howling, singing, and the clattering of pans, kettles, &c., which in the middle ages was raised on the occasion of an unequal marriage or the marriage of a widow, and which did not cease till money was paid to make peace. The C. was frequently characterised by violence and the singing of indecent verses, and in the 14th c. attempts were frequently made to put it down by the Church. See Philip's *Katzenmusiken* (Treib. 1849).

Char'kov. See KHARKOV.

Char'latan (introduced into Fr. in the 16th c. from the Ital. *ciarlatano*, 'a babbler or chatterer') is a word for a mountebank, quack, or empiric, because his chief art consists in prating in his own favour, and in making unwarrantable pretensions. Charlatanism manifests itself differently as character and circumstances vary, and accommodates itself skilfully to the fluctuating weaknesses of mankind. Sometimes, however, men have been classed with charlatans because they were in advance of their age, as Theophrastus von Hohenheim, better known as Paracelsus. See Büschel's *Ueber die Charlatanerie des Gelehrten seit Mencke* (Leips. 1790, with plates).

Char'lemagne, the Romance name of the Frankish monarch Karl der Grosse (q. v.). It may here be stated that all the Teutonic kings and princes, German and Norse, commonly found in Encyclopædias under a Romance form of their name, are treated of under the native and proper spelling, KARL.

Charleroi, a town in the province of Hainault, Belgium, on both sides of the Sambre, the high town on the left bank being strongly fortified. C., which is a station on the Brussels and Namur Railway, stands on an extensive and valuable coal-field, and there are numerous smelting-furnaces in the neighbourhood. There are besides, forges, nailworks, brickworks, and foundries for casting ordnance, and manufactures of woollen-yarn, glass, and hardware. The large ironworks of Couillet, producing one-third of all the cast-iron of Belgium, are within 2 miles of C. The fortifications, begun in 1666 by the Spaniards, were demolished by the French in 1794, but were restored after Waterloo. Pop. (1873) 12,150.

Charles I., King of Great Britain and Ireland from 1625 to 1649, was born at Dunfermline, 19th November 1600. He was the second son of James I. of England (VI. of Scotland), and became, in 1612, through the death of his elder brother Henry, heir-apparent to the throne, to which he succeeded in 1625. The nation greeted his accession with a burst of loyalty. His personal dignity contrasted with the garrulous vulgarity of his father, and the failure of the scheme for a marriage with the Spanish Infanta (even although he subsequently married Maria Henrietta of France, also a Roman Catholic princess) gratified the English people, who hated Spain above all countries. His early popularity, however, waned, when it was seen that he retained in all positions of trust his father's unpopular and imperious favourite, Buckingham. C. soon showed that the chief anxiety of his obstinate mind was to become an absolute monarch; and, in consequence, the Parliaments that met in 1625 and 1626 struck severely at Buckingham, the latter, led by Sir John Eliot and Mr Dudley Digges, going so far as to impeach the favourite. The King, however, stood by Buckingham, dissolved Parliament, threw Eliot and Digges into prison, and besides other arbitrary measures, resorted to forced loans, and a tax originally levied on seaports and known as ship-money. In 1628, C. found himself compelled to summon a Parliament, which, nevertheless, proved more resolute to maintain popular rights than its predecessors, and presented to him the celebrated *Petition of Right* (q. v.). A reaction in his favour, however, following upon the assassination of Buckingham, C. dissolved this Parliament also. Aided by Laud (q. v.) and Strafford (q. v), who had once been a member of the Parliamentary party, and by the Star Chamber and Court of High Commission (q. v.), he endeavoured to govern without a Parliament. Scotland, however, upon which he had sought to thrust a liturgy and the Episcopal form of government, rebelled, and proving victorious in the contest with C., he summoned a Parliament, subsequently known as the Long Parliament, which began to sit on 3d November 1640, and which showed itself more opposed to his despotism than any that had preceded. Headed by Pym and Hampden, it declared the decrees of the Star Chamber and Court of High Commission null

and void, passed a bill for triennial Parliaments, impeached Strafford, and caused him to be executed. For a time C. submitted, but on a rebellion breaking out in Ireland, and the Parliament increasing its demands, he drew his sword and threw away the scabbard. On the 4th January 1642, he appeared with a force of armed men in the House of Commons, and demanded that five members—Pym, Hampden, Hollis, Hazelrig, and Stroud—should be surrendered to him on a charge of treason. The two Houses of Parliament and the city of London took the side of the five members, who had escaped, and the King, retiring from London, raised the standard of civil war. For some time the Royalists had the advantage in the engagements that took place with the soldiers of the Parliament, but in the end they were unable to stand against the 'new model' army under Fairfax and Cromwell. Finally, the Royal army was crushed at the battle of Naseby, 15th June 1645, and C. sought refuge in the army of the Scots. They, however, delivered him up to Parliament. He now commenced a series of intrigues both with and against the Scots, and with the English Presbyterians, which enraged the Independents (who, under the leadership of Cromwell, formed the strength of the army) to such an extent, that they expelled the Presbyterians from the House of Commons, and appointed a court composed of men from the army, the 'Rump' or remnant of the House of Commons, and the city of London, to try the King. The trial, presided over by John Bradshaw, took place in Westminster Hall, and lasted from the 20th to the 27th January 1649. It resulted in the condemnation of C. to death, and, in spite of protests from the Scots and foreign nations, he was beheaded, 30th January. C. was personally a man of virtuous character, dignified, and adorned with a graceful culture, but politically an unscrupulous dissembler and intriguer. See Clarendon's *History of the Great Rebellion*; Carlyle's *Life and Letters of Oliver Cromwell*; Forster's *Statesmen of the Commonwealth*.

Charles II., King of Great Britain and Ireland, was the eldest son of Charles I., and born 29th May 1630. During the civil war he resided at the Hague with his mother. On his father's death, he assumed the title of King, and, on the people of Scotland offering him the crown in 1650, he proceeded thither, and was crowned at Scone in the beginning of 1651. But he never had much love for the Scots or for the Presbyterian form of worship. In spite of the defeat at Dunbar he put himself at the head of the Scotch army, and marched into England, but was followed, overtaken, and defeated by Cromwell at Worcester, September 3, 1651. After numerous remarkable adventures, C. succeeded in escaping to France, and subsequently to the Netherlands. There he remained till after Cromwell's death, when, on the suggestion of General Monk, he was restored to the throne, landed at Dover, 26th May 1660, and was received with extravagant demonstrations of loyalty, which were followed by the restoration of Episcopacy, the persecution of English Nonconformists and Scotch Presbyterians, and the execution of all who had had anything to do with the beheadal of his father. His reign proved one of the most disgraceful and humiliating in British annals. C., a shrewd, cynical, and in many respects able and resolute man, was a thorough sensualist and man of pleasure. He married the Portuguese Princess Catharine of Braganza, but he was guilty of the most shameless adulteries; and during his reign the British court was more unblushingly immoral than at any other period in history. To support his extravagance and debaucheries, he sold Mardyke and Dunkirk to the French, and entering into a secret treaty with their King, accepted a pension from him to make war against Holland, which, however, resulted in the Dutch fleet, under De Ruyter, entering the Thames, and in the conclusion of an ignominious peace, which he broke again on the receipt of fresh pecuniary gifts from France. By cleverly playing off, however, one set of politicians against another, C. succeeded, for a time, in ruling as an arbitrary monarch, and certainly kept the Scotch Presbyterians thoroughly in subjection; while the hideous imposture (1678) of a Popish Plot (q. v.) against his life kept up popular excitement in his favour. Parliament was at length aroused, and against C.'s will passed (1769) the *Habeas Corpus Act* (q. v.), and a bill excluding his brother James, Duke of York, from the throne owing to his having avowed himself a Roman Catholic. The *Rye-House Plot*, a great and somewhat mysterious conspiracy, of which his own illegitimate son, the Duke of Monmouth, was believed to be the head, and for connection with which many distinguished persons, including Lord William Russell and Algernon Sidney, were executed, caused a reaction in favour of C. and his brother. He died somewhat suddenly, February 6, 1685, avowing himself a Roman Catholic to a priest (Father Huddlestone) introduced to his chamber by his brother. The best that can be said of C. is that he was clever, good-natured, and personally courageous; but it should never be forgotten that he debauched the morals of his court, ruthlessly suppressed the liberties of Presbyterianism in the N., and secretly sold himself for lucre to the government of France. For a brilliant sketch of C.'s character and policy, see J. R. Green's *Short History of the English People*, pp. 616-619.

Charles IV. (*Le Bel*), the last of the Capetians, born in 1294, third son of Philippe le Bel, succeeded his brother Philippe V. (*Le Long*) in 1322, excluding Jeanne, Duchess of Burgundy, in virtue of the Salic law which Philippe V. had just established. C.'s second wife was his cousin-german, Maria, daughter of the Emperor Heinrich VII., and sister of King Johann of Bohemia. Although he relaxed the persecution of the lepers and the Jews, C. allowed Pope John XXII. (then at Avignon) to wreak his fury on the mendicant orders (whose vow of poverty was declared heresy) and on the sorcerers. He also helped Count Louis of Flanders to interfere by tolls with the commercial rights of his subjects. After the battle of Muhldorf C. became a candidate against Ludwig of Bavaria for the empire, which was finally divided between Austria and Bavaria. The disputes about the feudal rights in Guienne estranged C. and Edward II., and the former assisted his sister Isabella and the Lancastrians in the Harwich expedition, which placed Edward III. on the throne. C. died 31st January 1328, leaving Philippe de Valois (who succeeded him on the throne) as tutor to his daughter by his third wife, Jeanne d'Evreux.

Charles V. (*Le Sage*), born at Vincennes, 21st January 1337, son of Jean II. and Bonne of Luxembourg, practically reigned as Dauphin after his father was taken prisoner at Poitiers. 'La Jacquerie' gave great strength in the States-General to the *Tiers État* led by Bishop Robert le Coq and Etienne Marcel, Provost of the Traders of Paris, but C. played off against them the nobility and clergy and the provincial estates. After the devastating war of Charles the Bad of Navarre and Edward III. was closed by the peace of Brétigny, there was comparative quiet till the death of Jean (1364); after which the expedition of Du Guesclin against the Captal de Buch, Pedro the Cruel, the Black Prince, and his expulsion of the English, except from Calais, Bordeaux, and Bayonne, are the great features of C.'s reign. The 'Grand Companies' continued to harass the land, and the House of Burgundy rose into dangerous eminence. C. married Jeanne of Bourbon, and died 16th September 1380, leaving two sons. One of his *ordonnances* fixed the royal majority at fourteen. C. got his surname from his habits of life. 'He passed through the courses of study then known—an apt and eager scholar. Religious he was and learned, yet not a monk on the throne. To read in Latin and French, to know something of mathematics as then studied, of astrology, alchemy, theology, to gather round him well-known learned clerks and philosophers seeking science, to collect books and lay the foundations of the great library of Paris, to listen to grave moralities or noble deeds of olden history, or "divers fair tales from Holy Writ"—these were the occupations of the sickly king.' Kitchin's *History of France*, pp. 454-455.

Charles VI. (*Bien-Aimé*), the eldest son of Charles V., was born 3d December 1368, and succeeded his father in 1380. The Dukes of Berri, Bourbon, Burgundy, and Anjou shared supreme power during the minority of the boy-king. All these 'Princes of the Lilies' behaved badly. The last-named Duke abused the right of taxation to provide himself with means for his Sicilian expedition against Carlo Durazzo. The riots of *Maillotins* at Paris and Rouen, and of *Tuchins* in Languedoc, and the massacre of the Jews, showed the exasperation of the lower citizen class. In 1382, under the advice of the Duke of Burgundy, C. interfered in a struggle between Louis de Male, Count of Bruges and feudal lord of Ghent, and the popular party under Philip van Arteveld, who was utterly defeated at Rosbecque and Courtrai. This success was made the occasion of great severities against the Parisians, the patriotic Desmarets being executed and the taxes increased. The following year C. expelled

from W. Flanders the English crusade in favour of Pope Urban, which was commanded by the Bishop of Norwich. The marriage of the King to Isabella of Bavaria (1385), the expeditions against England (1386) of Admiral de Vienne and Constable Clisson, and the dismissal (1388) of the King's uncles by the 'Marmouset' party, mark the next few years. This introduced comparative quiet and economy until C.'s insanity, which occurred in 1392, and which brought his brother, Louis of Orleans, into prominence as the rival of the House of Burgundy. Louis, partly maintained by the exactions of his friend, the 'false' Pope Benedict XIII. at Avignon, stirred up the expedition of Glendower, which was crushed at Shrewsbury; and so neglected the helpless King and oppressed the great towns, that his murder, in 1407, by Raoul d'Octonville, a follower of the Burgundian Duke Jean sans-Peur ('the Fearless'), was received with 'ecstasies of joy,' and publicly defended before the Dauphin and the nobles of France, met at the Hôtel St Pol, in March 1408. The Burgundian victory over the Liègois at Hasbain led to the 'paix fourrée' of Chartres, but the struggle between Burgundy and the Comte d'Armagnac, father-in-law of Orleans (in which the city of Paris took a leading part) was continued till the treaty of Pontoise (1414). The invasion by the English succeeding at Agincourt and elsewhere, the Armagnacs became unpopular, and in 1418 were massacred in Paris by the Burgundians. In revenge, Jean of Burgundy was murdered (1419) on the Bridge of Montereau by Tanneguy-Duchatel, one of the chiefs of the Orleanist party; and his son embracing the English cause, Paris was betrayed to Henry V., who by the treaty of Troyes (1420) obtained Catherine of France in marriage, and the right of succession to the throne. Charles, however, survived Henry by two months, dying 21st October 1422. 'He had reigned for forty-two years: long he had been but a name, a shadow. His voice, heard at rare intervals on some piteous occasion, was as if it came from the tomb: it usually had a plaintive gentleness, a touch of sad forgiveness in it. . . . The people called him "C. the Well-Beloved," clinging to him with a touching helplessness.' Kitchin's *History of France*, pp. 513-514.

Charles VII. (*Le Victorieux*, or *Le Bien-Servi*), born at Paris, 22d February 1403, was the fifth son of the preceding, whom he succeeded in 1422. In the same year he married Marie of Anjou, daughter of Louis, King of Sicily. He had previously, in 1418, assumed the title of Regent, and had acted with the Constable d'Armagnac against the Burgundian faction. While the latter occupied Paris, C. held a Parliament at Poitiers and Bourges. The treaty of Troyes (1420) had transferred the French crown to Henry V. of England. Accordingly C. had to fight with Bedford and other English commanders at Crevant (1423), Verneuil (1424), and on the fatal 'Day of Herrings' (1429) for his existence as a sovereign. The appearance of Joanne d'Arc at the siege of Orleans, and the dismissal of the favourite La Trémouille, changed the course of events. C. himself wakened up from the frivolous sloth in which he had been living, and detaching by the treaty of Arras (1435) the House of Burgundy from the English cause, he gained several important victories over his ancient foes, organised by his *ordonnances* the first standing army (cavalry and infantry) of France, and made an honourable truce in 1444. He also, by the Pragmatic of Bourges, resisted the Pope's fiscal claims on the national Church. When war broke out again, the English were speedily driven from Normandy, Guienne, and Gascony. In 1457 they had left the country. Suspicions of the Dauphin (afterwards Louis XI.) hastened C.'s end: he died 22d July 1461. He had twelve children, of whom one daughter, Catherine, was married to Charles of Burgundy; another, Madeleine, to Gaston de Foix. C. was much under the good influence of Agnes Sorel. In this reign Jacques Cœur founded French trade with the Levant, but was afterwards forced to flee from his country to escape the jealousy of the nobles. See Kitchin's *History of France*, b. iv. c. 6, 7; and Vallet de Viriville's *Histoire de C. VII.* (3 vols. Par. 1862-65).

Charles VIII. (*L'Affable*), born at Amboise, 30th June 1470, was the only son of Louis XI. and Charlotte of Savoy: his legitimacy has been questioned. He was declared king on his father's death in 1483. His sister, Anne of Beaujeu, became regent, and conducted a successful war against the Orleanists, among whom were the future King Louis XII. and De Comines, the battle of St Aubin (1488) deciding the final campaign in Brittany. In 1491 C., who had taken Dunois as his adviser, married Anne of Brittany, who had been already married by proxy to Maximilian. This led to a war with Germany, with whom Henry VII. sided. C., however, wished to prosecute the claim to Naples, which Charles of Anjou had bequeathed to his father; he also dreamed of conquering the Eastern Empire. He led an army of 30,000 men into Italy, drove the Medicis from Florence, obtained the Turkish Prince Zizim from Pope Alexander VI., and occupied Naples almost without striking a blow. The formation of the League of the Pope, Venice, Milan, Spain, and the Emperor caused C. to return home, winning on his way the victories of Fornovo and Novara. Gonsalvo de Cordova immediately drove the French out of Naples. C. was arranging a new Italian campaign when he died, 7th April 1498, predeceased by his son, Charles-Orland. C. was remarkable for courage and enterprise, but very sickly in body. See the *Mémoires* of Comines; Ségur's *Histoire de C. VIII.* (2 vols. 1835); and Varillas' *Histoire de C. VIII.*

Charles IX., born at St Germain-en-Laye, 27th June 1550, was the second son of Henri II. and Catherine de Médicis, and succeeded his brother François II. on his death in 1560, having previously borne the title of Duc d'Orleans. C. was quite passive in the earlier years of his reign, the Queen-mother pretending to favour the Huguenots. He was, however, brought over to the Catholic side by the interview which the French court had with the Duke of Alva (representing Philip II.) at Bayonne in 1567. The Huguenots then attacked Paris, and were defeated by Montmorency at St Denis. After the short truce of Longjumeau, Condé, who had attempted to gain possession of the King's person at Meaux, was defeated at Jarnac, and in 1570 the peace of St Germain-en-Laye was signed with Henri of Navarre, who had now become leader of the Huguenots. C. seems to have fallen under the influence of Coligny at this time: probably suspicion of the Guises and jealousy of his brother Henri contributed to this. He married Elizabeth, the daughter of Maximilian II., and betrothed his sister Marguerite to Henri of Navarre. To the assassination of Coligny, and the general massacre of 24th August 1572, C. consented under considerable moral pressure. The peace of Rochelle showed that the massacre was a great blunder. C. died 30th May 1574, leaving no legitimate children. His mistress, Marie Touchet, afterwards married François Balzac, and became the mother of Henriette d'Entragues, the mistress of Henri IV. C. wrote a book, *La Chasse Royale*, printed in 1625, and wrote verses of high merit. Singular to say, the King who consented to the Massacre of Bartholomew also authorised the famous Calvinistic version of the Psalms by Marot to be printed. See Varillas' *Histoire de C. IX.*, and Sorlin de Sainte-Foy's *Histoire de la Vie, Mœurs, et Vertus du Roi C. IX.*

Charles X., the fourth son of the Dauphin Louis and Marie Josèphe of Saxony, and grandson of Louis XV., was born at Versailles, 9th October 1757. In 1773 he married Maria Theresa of Savoy. He was then known as Charles Philippe, Comte d'Artois. His life was extremely vicious and stupid. C. supported the oppressive fiscal measures which precipitated the Revolution. Early in the struggle he emigrated with his sons, the Duc d'Angoulême and the Duc de Berri, and afterwards meeting his brother Louis, Comte de Provence, at the Conference of Pilnitz (1791), they issued the declaration which provoked from the National Assembly a decree placing their property under sequestration, and ordering them to return to France in three months. C. took part in the campaigns of the Dukes of Brunswick and York. He also accompanied Lord Moira's expedition of 1795, which was to assist the rising of Charette and Stofflet in the royalist provinces of the W. 'Monsieur,' as C. was then called, timidly withdrew without landing, went to Holyrood, and after the peace of Amiens (1802) to London, which he did not leave till 1814, when he entered Paris, and was enthusiastically received there and in the provinces. On the return of Napoleon, C. was sent to Lyons to organise resistance, but was obliged to retire with his brother to Ghent. On the second restoration, in spite of his vows to carry out the charter of the constitution, he became the head of the reactionary party against the moderate programme of the King and his ministers. After the assassination of his son, the Duc de Berri, C. succeeded in dissolving the Richelieu ministry, and bringing in that of Villèle and Peyronnet, which engaged in the inglorious war with Spain (1823). In 1824, in his sixty-seventh year, he succeeded Louis XVIII.,

and at once began a retrograde policy, encouraging Ultramontane pretensions, attacking the freedom of the press (the *Courier* and the *Constitutionnel* were both prosecuted), and strengthening the Royalist Chamber of Peers by numerous creations. The elections of 1828 produced the more enlightened ministry of Portalis, Royer-Collard becoming President of the Chamber of Deputies. In spite of this, and of the popular French intervention in Greece, a rupture took place on the question of Departmental administration; and the formation of the Polignac and Labourdonnaye ministry called forth the famous protest of the 221 deputies. Immediately after the successful expedition to Algiers, C. published the ordinances of 25th July 1830, which threw Paris into the revolution known as the Three Days of Barricades. The King, in alarm, made ineffectual efforts to conciliate the popular party. It was too late. He then departed for England, where he assumed the title of Comte de Ponthieu. The rest of his life was spent quietly at Holyrood, &c. He died, 6th November 1836, at Gorz. C. was the last Bourbon King of France. His intellectual weakness has descended to his grandson, but not his immoralities.

Charles the Rash (*Le Téméraire*), Duke of Burgundy, born at Dijon, 10th November 1433, was the son of Philippe le Bon and Isabella of Portugal. His passionate martial nature burst into action when Louis XI. attempted to take the Somme towns. C. formed a League of the Public Good, defeated the King at Montlhéry, and by the treaty of Conflans (1466) extended his father's hereditary possessions. When in 1467 he became Duke (he was previously known as Comte de Charolais), he suppressed with terrible severity the insurrection of the people of Dinant and Liège, and strengthened his position by marrying Margaret, the sister of Edward IV. of York. Afterwards, at the interview of Péronne, a sort of agreement was come to between the great vassal and his lord; but in 1471, C., taking some excuse from the Wars of the Roses, opened hostilities in Picardy, Normandy, &c., with an army composed partly of English and Italian mercenaries, but chiefly of the old feudal levy, which he opposed to the 'Compagnies d'Ordonnance' of Louis. In spite of his excellent artillery he was compelled to raise most of his sieges. He now thought of reviving the old kingdom of Burgundy by the addition of Lorraine, Provence, and Switzerland. These designs brought him into conflict with the Emperor Friedrich at Neuss, King René II. at Nancy, and with the Swiss Cantons, who defeated him utterly at Granson, and again, with the help of Lorraine cavalry, at Morat. With a third army C. made a final effort by laying siege to Nancy (1477), where he was killed (January 5), and his army dispersed. C. was unusually well educated for his age, attentive to religious fasts and ceremonies, fond of chivalry and ancient military custom, charitable to the poor, and energetic as a ruler, but rash in war and merciless in discipline. See De Comines' *Mémoires*; De Barante's *Histoire des Ducs de Bourgogne de la Maison de Valois* (13 vols. Par. 1824); Kirk's *History of Charles the Bold, Duke of Burgundy* (2 vols. Lond. 1863); and Freeman's *Historical Essays* (Lond. 1872).

Charles'ton, the chief city of S. Carolina, U.S., is situated on a tongue of land, having the Cooper river on the E. and the Ashley on the S.W. Both of these rivers are wide and deep, affording good accommodation for shipping, and the bay or estuary which they form extends eastward for 7 miles. There is a troublesome sandbar at the entrance, broken, however, by a navigable channel of from 16 to 22 feet of water. Approaching from the ocean the effect is fine, with the bay, its islands, forts, and shores spread out, and the spires and shipping of the city in the distance. C. has some thirty churches and a large orphan asylum, negro-schools, schools and charities for white people who have suffered in the war, and the State Medical College (1785). C. has an extensive trade in cotton and rice. In the year ending 31st March 1875, its exports amounted to $19,532,393; 371 vessels cleared from the port, of 310,139 tons; and 473 entered, of 370,771 tons. Most of its bread-stuffs and manufactured goods are imported from the N. C. was founded in 1672, and in 1685 many French Huguenots settled in it. Before the civil war it was a charming city, with beautiful villas, gardens, and promenades; and was famed for the hospitality of its citizens and the gaiety of its society. On the 12th April 1861, the civil war began by the firing of the first gun on Fort Sumter in C. harbour. In 1863 the Union forces bombarded the city, and in February 18, 1865, they occupied it again. During the war a great fire broke out, and it left for years a track of desolation across the city. Pop. (1870) 48,956.

Charlestown, a seaport of Massachusetts, U.S., is separated from Boston by the Charles river. It stands on an elevated peninsula, containing Breed's or Bunker Hill, crowned with a monument to commemorate the first battle of the Revolution, fought here June 17, 1775. C. contains the Massachusetts state prison, and an extensive U.S. navy yard. It was annexed to the city of Boston in 1873. Pop. in 1870, 28,323.

Charles' Wain or **Waggon**, otherwise called the *Plough*, a popular name for the seven conspicuous stars in the constellation Ursa Major (q. v.).

Charlet, Nicolas Toussaint, a French painter, born in Paris, 20th October 1792, was the son of a dragoon, and was familiar from childhood with barrack life. He was employed as a clerk in the Paris mayoralty till 1816, when his Bonapartism put an end to his official career, and the pressure of circumstances drove him into art, the special tendency of his mind leading him into the department of kindly and humorous caricature. His designs chiefly represent the phases of life in the barrack, the tavern, and the homes of the poor, but are always refined and genial. In his drawing, however broad the humour may be, there is always a basis of serious sentiment. By his *Épisode de la Campagne de Russie*, exhibited in 1836—a work remarkable at once for vigour of style and elevation of feeling—C. established his claim to high rank as a painter in oils. He died at Paris, 29th December 1845. See Jules Janin, *Notice Necologique sur N. T. C.* (Par. 1847).

Charleville, a town in the department of Ardennes, France, on the Meuse, nearly opposite Mézières, with which it communicates by means of a stone bridge. It lies near the base of *Mont Olympe*, has fine promenades, a valuable library, large ironworks, and an active railway and river trade in wine, coal, iron, &c. Pop. (1872) 11,410. C. was founded in 1606 by Charles, Duke of Nevers, hence its name.

Charl'ois, a village 2 miles S.S.W. of Rotterdam, on the Maas, notable as the scene of a terrible catastrophe in the year 1512, when some 8000 persons in a religious procession were drowned while crossing the frozen river.

Charlotte Am'alie, the capital of St Thomas, W. Indies. It has a spacious harbour, and is the W. Indian station for the English mail-packets. Pop. 12,560.

Charlott'enburg, a town of Prussia, province of Brandenburg, on the Spree, 4½ miles W. of Berlin, of which it may be regarded as a suburb. It has a royal palace, built in 1699, a beautiful park, in which there is a large orangery, a theatre, and a mausoleum of granite, under which rest the remains of Friedrich Wilhelm III. and Queen Luise. The principal industries are dyeing, printing, manufactures of machines, shot, porcelain, cement, wax, chocolate, soap, glass, &c. Pop. (1871) 19,518, of which 139 are soldiers.

Charlotte Town, the capital of Prince Edward Island, Dominion of Canada, on Hillsborough Bay, at the confluence of three rivers, each navigable for several miles. It possesses a very commodious natural harbour, vessels being able to ascend each of the rivers to a considerable distance. C. has also an iron-foundry, a woollen factory, and considerable shipbuilding. Pop. (1871) 8807.

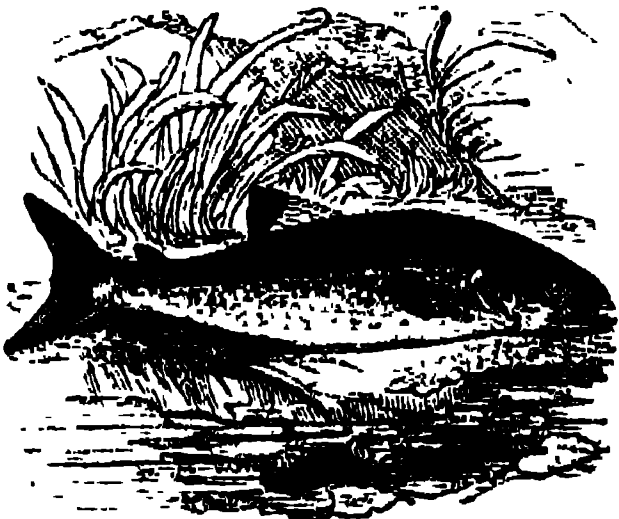
Charm (Fr. *charme*, Lat. *carmen*, 'a song'), a form of words in verse (hence the name), believed to possess a protective, hurtful, or healing power. For this purpose verse has always been held to be more potent than prose. Latin literature abounds with examples of the use of 'carmen' in the sense of a magic spell. The occult power dwelling in the C. exerted its mysterious influence during the 'incantation' or rhythmic recital of the words. But gradually this notion of a C. died out as the belief became confined to the more ignorant of the community, and now the word denotes any unintelligible jargon scribbled on paper by a quack and carried about by his dupes. See AMULET, INCANTATION, MAGIC.

Char'nel-House (Fr. *charnier* or *charnel*, Lat. *carnatis*, from *caro*, 'flesh'), a place in which the bones of the dead thrown up by

gravediggers used to be deposited, at a time when overcrowded churchyards and other burying-grounds did not invite legislation against the nuisance they constituted. The C.-H. was sometimes a building complete in itself, having a chantry attached to it; but it was commonly a crypt under a chapel—not unfrequently, indeed, under the church itself.

Cha'ron first appears in later Greek mythology as a son of Erebus, appointed by the gods to ferry across the rivers of Hades the shades of such dead as had been buried. He exacted as toll from each an *obolus* or *danake*, and the coin was placed in the mouth of the dead previous to burial. C. is represented as a slovenly old man with squalid beard and clothes.

Charr (*Salmo salvelinus*), a species of Teleostean fishes belonging to the salmon genus, and included in the family *Salmonidæ*. The C. is a fresh-water fish, occurring in British and European lakes and rivers. The Lake of Geneva is celebrated for its C.—the *ombre chevalier* of that lake. The body of this fish is elongated, the tail forked, and the fins of small size. The back is coloured dark olive; the sides are of lighter colour, and spotted with red or white; the belly is light in colour, and may be pale or even deep orange. The colours vary with the season and reproductive periods of these fishes. Only the front part of the vomer is provided with teeth, as in the true salmon and bull-trouts. The C. feeds on crustacea, insects, &c.; and appears to live in deep water during summer, but to come to the surface and shallower waters in the autumn season. It spawns in autumn or winter, and ascends rivers for that purpose. The fish is more plentiful in the N. of England lakes than in Scotch waters; but its numbers have greatly decreased owing to the indiscriminate fishing permitted by the want of legislative measures.



Charr.

Char'ta Mag'na. See MAGNA CHARTA.

Charte (Lat. *charta*, 'a paper'). Before 1789 France had properly speaking no great written guarantee of constitutional freedom. The successive constitutions of the Revolutionary period and the First Empire will be noticed elsewhere. The first French C. is properly that of 1814. The Senate, under Talleyrand, had already, on 6th April, prepared a draft constitution, which was 'to be submitted to the acceptance of the French people, and to which Louis-Stanislas Xavier, freely called by the people, was to swear conformity.' But, in spite of the declaration of St Ouen, Louis set this aside, and submitted to a meeting of the Senate and Corps Legislatif the *C. Constitutionelle* of 4th June 1814, which is couched entirely in the language of concession, and in its preamble expressly affirms that the person of the King contains all authority. The document deals with public rights, such as equality before the law, equality of contribution to public burdens, freedom of civil and military offices, personal liberty, and liberty of conscience, freedom of discussion. The Catholic religion is declared to be the state religion, conscription is abolished, and the enjoyment of the nationalised property is guaranteed to its present owners. Then comes a chapter on the forms of government, defining the supreme executive vested in the King, the responsibility of ministers, the legislative power vested in King, Chamber of Peers, and Chamber of Deputies, the initiative of legislation, and the special initiative in taxation. The Chamber of Peers is next treated of: they sit in secret, have the sole jurisdiction in high treason, are free from arrest in matters criminal. The King has an unlimited power of creating peers, but the peer must be thirty years old before he has a deliberative voice. With regard to the Chamber of Deputies from the electoral colleges, the deputies are elected for five years; each one must be forty years old, and a ratepayer to the extent of 1000 frs. The suffrage is confined to ratepayers of 300 frs. The King may dissolve the Chamber, but must call another in three months. The persons of deputies are protected during session. The Chamber has the right of accusing ministers, who may be chosen from either House. The judges named by the King are not removable, except Juges de Paix. Juries are preserved. The whole military service is to remain in possession of its honours and pensions; the public debt is guaranteed; the ancient nobility resumes its titles. This C. is modified by the *Acte Additionnel*, drafted by Benjamin Constant, which, during the Hundred Days, Napoleon passed on 22d April 1815, and which received 1,300,000 votes. It reduces the minimum age of deputies to twenty-five, and removes the ratepaying qualification; an indemnity is given to representatives; offences of the press are appropriated to the jury; the duty is laid on ministers to give explanations when required; and the intervention of the Legislature is made necessary in loans, alienations of territory, and in the levy of forces. On the second Restoration, which had proclaimed at Cambrai the dogma of Legitimacy, Louis promised to reform fourteen articles of the C., but failed to do so. After the assassination of the Duc de Berri, a long series of retrograde measures were carried by the ministries of Villèle, Peyronnet, and Polignac; the National Guard was disbanded; new peers were indiscriminately created. Then came the address of the 221 members, 'that the policy of the Government was not consistent with the wishes of the people;' and the royal ordinances of St Cloud (25th July 1830), the object of which was the total destruction of the liberty of the press, and the restriction of electoral power to the wealthier classes. These ordinances, which dissolved the Chamber, were unconstitutional. Associations were formed in Normandy, Burgundy, Lorraine, and Paris to resist payment of taxes not voted by the Chamber; then came the Revolution, the new or revised C. of 6th August 1830, and the ministry of Laffitte, Guizot, Dupont de l'Eure, Gérard, Bignon, Casimir Périer, Duc de Broglie, Baron Louis, Molé, Sébastiani, and Dupeir. One important point in this C. was that the regulation of the franchise, or, in the French constitutional language, the organisation of the electoral colleges, was not made part of the constitution, but left to the Legislature, so that universal suffrage might have been legally introduced before 1848. A direct initiative is given to both Chambers; the deputies and the electors nominate their presidents; the sittings of the Upper Chamber are made public; the Catholic religion ceases to be the state religion in this sense that all other Christian sects are admitted to receive state aid. All the peerages created by Charles X. were annulled, and speedy legislation was promised as regards the responsibility of the executive, the organisation of primary education, the re-election of deputies receiving official posts, the franchise, the use of a jury in the trial of political and press offences. In its main features the second repeats the first C. By a subsequent law of 29th December 1831 the twenty-third article, which gave an unlimited right to create hereditary and life peerages with pensions, was limited to the nomination of life peers without pension from certain classes which are enumerated. There were three parties concerned in the preparation of this C.; the Progressists, of whom Constant was the type; the *Doctrinaires*, or 'quasi-Legitimists,' who did not wish to go beyond the principles of 1814; and the practical majority of the Chamber led by Dupin the elder, whose anxiety was to point out that Louis Philippe succeeded, not as heir, but by choice. In 1831 the franchise was lowered from 300 to 200 frs. of direct taxes, and the eligibility qualification from 1000 to 500 frs. The only other constitutional law of importance prior to 1848, when the republican constitution was introduced, was the regency law of 1842.

Char'ter, in the law of England, is the instrument conveying a royal grant. It is generally written in Latin. The grant may be of lands, houses, or honours, not already possessed; or it may be confirmatory of a grant already made; in which case it is called a C. of Confirmation. (See DEED.) In Scotch law, a C. is the written evidence of a grant of heritable (real) property, made under the condition that the grantee shall annually pay money or perform a service to the granter; and this must be in the form of a written deed. The granter is termed the superior; the grantee, the vassal. The vassal is said to *hold* the subject of the superior. The annual sum or service stipulated for is called the *Duty*. Charters are either *Blench* or *Feu*. A blench-duty is nominal, as a penny Scots or a red rose, *si petatur tantum*. A Feu-Duty (q. v.) is a consideration of value.

Char'terhouse (a corruption of the Fr. *Chartreuse*, Latinised Carthusian), originally a Carthusian monastery, founded about 1370 by Sir Walter Mauny outside of the bar of W. Smithfield.

It was surrendered to Henry VIII. June 10, 1535, and after having been possessed by several eminent personages in turn, was sold for £13,000 by the Earl of Suffolk to Sir Thomas Sutton, who founded on it a magnificent hospital, and endowed it for a master, preacher, a head schoolmaster, a second master, forty-four boys, and eighty decayed gentlemen, known as *Poor Brethren*. The poor brethren must not be under fifty years of age, and must have been housekeepers; they must also be bachelors and members of the Church of England. The boys, or scholars, are admitted between the ages of ten and fourteen; and both they and the poor brethren gain admission less because of their poverty than of the influence which they can command. The poor brethren have each an apartment, food, and about £26 a year for clothing, &c., and the scholars receive free board and education. The masters, however, are allowed to receive others either as boarders or as day-scholars, and as the C. is one of the best English schools, the number of these is always considerable. Among those C. boys who distinguished themselves in after-life are Barrow, Addison, Steele, Wesley, Thirlwall, Grote, Thackeray, Eastlake, and Havelock. A few years ago the school was removed to Godalming in Surrey.

Charter-Party, this is a contract for letting a ship or part of one to a merchant, called the freighter or charterer, for the conveyance of goods for one or more voyages. It may be under seal, or in writing only. A memorandum of agreement, or the heads of an agreement for the drawing up of a C.-P., are frequently all that passes between shipowner and freighter, and they are as binding as a formal instrument. By the C.-P. the owner or master usually undertakes that the ship shall be seaworthy, and otherwise in condition to carry the goods; that the ship will be ready on the day appointed; that after receiving her lading she shall sail on the first opportunity, and safely deliver her goods at the place of consignment. The charterer undertakes to pay the freight, and load and unload within the time agreed on. Each binds himself by a penalty to fulfil his undertaking. The freighter may underlet, or put in the goods of another, unless contrary to the contract. The responsibility of the owner of the ship begins when the merchandise is put on board. The freighter generally insures. See BILL OF LADING.

Char'tism was the articulate expression of the misery and sense of wrong felt by the working classes (both artisan and agricultural) in the long period after the Napoleonic wars, when, without education or political rights or trade organisation, they expected to counteract high prices and low wages by a redistribution of political power. The same movement is seen in the 'Friends of the People' (1793), and in the 'Manchester Blanketeers' (1819). In 1830 Lancashire and Yorkshire operatives were receiving 4d. a day for twelve hours' work, and in some parishes the whole available property was insufficient for the relief of the poor, although the weekly allowance for a labouring man (including earnings) was sometimes only 3s. 1d. per week, when the quartern loaf was 1s. Rick-burning and machine-breaking were frequent in that year. The influence of a bad poor-law and of the vexatious corn-laws was in 1835 intensified by a bad harvest; and the excitement which the Reform Act of 1832 had partially allayed broke out in the Dorchester labourers' meeting in Copenhagen Fields (1834), the Lancashire torchlight meetings of 1838, and the Birmingham National Convention (elected by Chartists) of 1839. The 'Charter,' drawn up in 1838 by six radical M.P.'s. and six members of the 'Working Men's Association,' demanded universal suffrage, ballot, annual Parliaments, payment of members, abolition of the property qualification of members, and equal electoral districts. A monster petition was presented to the Commons on 14th June 1839, but the motion to refer it to a committee was negatived by a majority of 189. This was followed by riots in Birmingham, Sheffield, Newcastle, &c., by forced contributions and the attempted suppression of religious services; but fortunately the threat of a 'sacred month,' or cessation from labour during August, was not carried out. The best Chartists, such as Hetherington, Vincent, Lovett, and even Fergus O'Connor, were 'moral force' men, and supported their principles in the *Dispatch* (London), *True Scotsman* (Edinburgh), *Journal* (Birmingham), *Chartist Circular*, the *Northern Star*, and other papers. Prominent among 'physical force' Chartists was a Methodist minister named Stephens, who countenanced torchlight meetings (after they were by proclamation declared illegal), and was tried and sentenced to eighteen months' imprisonment at Chester in 1839. The popularity of Vincent, and the report that he had been cruelly treated in prison at Newport (in Wales), occasioned the armed attack on that town under the leadership of Frost (a linendraper and magistrate), Williams (a publican), and Jones (a watchmaker). These men were tried for high treason, sentenced to death, and transported for life. In 1840–42, under O'Connor and O'Brien, C. was successfully revived, joint cause being made with the Irish Repealers. Mr Duncombe presented in Parliament the petition of the 'National Chartist Association' (which possessed 400 affiliated societies and 40,000 members); and in the N. of England there was a systematic 'turn-out' from the factories, although little violence was done to person or property. In spite of numerous prosecutions (on one of which Thomas Cooper was sent to prison for two years), the 'complete-suffrage union' of Joseph Sturge and the abortive land scheme of O'Connor (who was now supported by Ernest Jones) continued to fan the excitement. O'Connor, who had weakened his position by opposing the Anti-Corn-Law League, was nevertheless returned to Parliament in 1846, on the downfall of Sir Robert Peel's administration, but nothing of importance occurred till after the French Revolution of 1848, when a monster meeting took place on Kensington Common. The petition presented by this meeting (against the proposed procession of which to Westminster great military preparations had been made) was found to be in great measure a dishonest fabrication. This fact, the prosperity of trade, and the increase of emigration, all tended to extinguish C. O'Connor became a lunatic. The resolutions in favour of household suffrage and ballot, moved by Mr Hume in 1848, indicated that portions of Chartist principles were destined to survive. One of the 'points' has already been conceded—the ballot; others are in a fair way of being realised—*e.g.*, 'universal suffrage;' but the experience of America does not commend the principle of 'payment of members.'

Char'tres, the capital of the department Eure-et-Loire, France, lies in a hilly amphitheatre on the Eure, 47 miles S.W. of Paris by railway. It is in great part composed of picturesque old houses, and has many fine promenades. Its large cathedral of *Notre Dame*, rebuilt during the 11th, 12th, and 13th centuries, is one of the finest in France, and is almost unsurpassed for wealth of ornamental sculpture. The façade supports two elegant spires, the principal one being 400 feet high; and the windows are traced with 5000 figures, exhibiting fine artistic design and the rarest delicacy of colour. There are several other handsome churches, as those of St Pierre and St André, also an imposing episcopal palace, founded by Madame de Maintenon, a massive town-hall, a theatre, &c. C. has large manufactures of steel, woollens, leather, hoisery, &c., and an active trade in grain, wine, and cattle. Pop. (1872) 16,977. C. was the capital of the Gallic *Carnutes*, and became the *Autricum* of the Romans. In the middle ages it gave name to a country which fell to the crown of France in 1286, was raised to a duchy by François I., and became an appanage of the Orleans family, whence the eldest son of the Duc d'Orleans generally bore the title of Duc de C.

Chartres, Duc de, Robert-Philippe-Louis-Eugène-Ferdinand d'Orleans, younger son of the late Duc d'Orleans, was born in Paris, November 9, 1840, and at the Revolution of 1848 passed into exile with the rest of the family. He was educated at Eisenach, resided for some time at Richmond, and served along with his brother in the Federal army during the campaign of the Potomac (1862) in the American civil war. In 1863 he married his cousin, the eldest daughter of the Prince de Joinville, and in 1870 returned incognito to France, entering the army of General Chanzy under the name of Robert le Fort. After the German war, the National Assembly having revoked the law of banishment against the Orleans family, he was named commander of a squadron by M. Thiers, and served in Algeria in 1872.

Chartreuse', La Grande, a famous monastery in the department of Isère, France, 13 miles N. of Grenoble, picturesquely situated in the valley of the Guiers (nearly 4000 feet above the sea), enclosed by lofty mountains, and almost inaccessible. It was founded in 1084 by St Bruno, broken up at the Revolution of 1789, and reoccupied since 1816. The well-known liqueur of the same name is manufactured by the monks, and is so much in repute, that cautions are regularly advertised in the English and other newspapers against spurious imitations.

Charts are the maps used in navigation, and in which are specially noted the depth of soundings, the position of rocks and sandbanks, and the direction of currents and prevalent winds. The English Admiralty Office expends a large sum annually on the preparation of elaborate C. on a large scale, and these are sold at nominal prices, ranging from 3s. to 6d. each. At various places, as Gibraltar and Cape Town, there are depôts for the supply of C., which are now in almost universal use.

Char'tulary (Late Lat. *chartularia*), a collection of charters belonging to a church or religious house, a civil corporation, or even private individuals. Where these were numerous, the necessity of such a collection, consisting of copies of the original charters, would soon suggest itself; and hence we find that chartularies were made in France as early as the 10th c. Many of them have been printed, and contain matters of great interest and value, historical and antiquarian.

Charyb'dis. See SCYLLA.

Chase, Salmon Portland, a prominent American statesman, was born in Cornish, New Hampshire, January 13, 1808, graduated at Dartmouth College, 1828, and, after studying law, settled in Cincinnati about 1830. C. was at first a Democrat, but in 1841 he assisted in organising the Liberty party, and sought to denationalise slavery. He was elected a senator in 1849, and in 1855 was made Governor of Ohio. In 1861 President Lincoln appointed him Secretary of the Treasury, and C. signalised himself by his bold financial policy during the crisis of the war. He was the originator of the far-famed *greenbacks*. In October 12, 1864, C. was appointed Chief-Justice of the United States, which office he held till his death, May 7, 1873. C. stood very high in the esteem of his countrymen. He was unquestionably a man of noble character and great intellectual vigour, and his career must always form an important part of the history of his time.

Chas'idim (Heb. *ka-sĕ'thēm*, 'the pious') were the Puritans among the post-Babylonian Jews. They were distinguished by their efforts after a Levitical and sacerdotal purity; for besides their leaders, who were properly the offerers of sacrifice, each individual obtained the standing of a priest by taking part in the purifications and sacrifices. They imposed upon themselves great acts of self-denial, and to a great extent had a community of goods. In process of time the association was split up, the ultra-Puritan party being the Essenes, while the moderate party, to which the Pharisees belonged, retained the name of C. A sect of C., which has survived to the present day, with doctrines drawn from the Bible, the Talmud, and especially the Cabala, was founded in Poland in the middle of the 18th c. by Rabbi Israel ben Eliezer Baal Shem.

Cha'sing, the art of chiselling or otherwise cutting out ornamental details on metallic surfaces, principally applied to the precious metals and bronze. C., indeed, in its widest signification may be said to be the artistic sculpture of metal-work. The tools used by the chaser are 'gravers' and other cutting implements, 'rifflers,' and 'mats,' for producing a soft superficial texture. Repoussé-work (q. v.), after being beaten up into form, is finished by C., as are also cast and 'struck' or stamped ornament; and C. in relief is also applied to metal in the flat.

Chass'é, David Hendrik, Baron, a Dutch general and patriot, was born at Thiel, March 18, 1765, entered the army of his country at the age of ten, and was made lieutenant in 1781, and captain in 1787, but subsequently joined the army of France. He rose to the rank of lieutenant-colonel in 1793, distinguished himself fighting against Prussia in 1796 and 1799, and was popularly called *Général Bayonnette* during the Peninsular war. In 1811 Napoleon made him a baron of the Empire. After the first restoration of the Bourbons, he returned to Holland, and was lieutenant-general of the Dutch army, fought at Waterloo, was appointed Governor of Antwerp after the peace, and defended the town for about a month in 1832 with a garrison of 6000 men against a Belgian and French force 75,000 strong. C. died at Breda, May 2, 1849.

Chasseurs' (Fr. 'huntsmen'), the name originally given to a French body of sharpshooters or skirmishers, formed in 1741, in imitation of the Tyrolese jägers (chamois-hunters) of the Austrian army. The French C. were at one time both infantry and cavalry, but the name came to be applied strictly to a celebrated foot corps organised in 1835 by the Duc d'Orleans, armed with improved rifles, and called *C. de Vincennes*, from having been quartered at Vincennes. In 1838 these troops were raised to a battalion, and they have since become known also as *Tirailleurs*. There are light troops corresponding to the C. in almost all European armies.

Chaste-Tree. See VITEX.

Chas'uble (*casula*, *casibula*, a diminutive of *casula*, used by Isidore of Seville for 'a mantle'), the principal garment of a Roman Catholic priest, and as such often called 'the vestment' in old English inventories. It is worn uppermost at the celebration of mass. Originally in the form of a circle, it was retrenched in the Western or Latin Church till it became oblong. In England it was generally adorned with Y-shaped crosses and orphreys, or with embroidered ornaments down the front and along the edges; and later with a Latin cross on the back, and an orphrey in front. The hooded C. seems to have existed in France as early as the 6th c.; it is the original of the *casula processoria*, 'processional C.,' which was formerly worn at processions, but not generally at mass. The modern-shaped Roman and French C. is the invention of the last two centuries.

Chat (*Saxicola*), the name applied to a genus of Insessorial birds, including several species, and belonging to the sub-family of the *Erythacinæ* or robins, which in turn forms a group of the larger division *Sylviadæ* or warblers. The stone-C. (*S. rubicola*), whin-C. (*S. rubetra*), and wheatear (*S. œnanthe*), are three familiar species included in this genus.

Châ'teau, or **Châtel** (Old Fr. *chastel*), a word of common occurrence in the names of French towns, and derived from the Latin *castellum*, 'a fort.'

CHÂTEAUDUN, a town of France, department of Eure-et Loire, on the Loire, 26 miles S.S.W. of Chartres. It has been almost entirely rebuilt since 1723, when it was destroyed by fire. Besides a castle, which dates from the 10th c., it has several fine churches, with the interesting ruins of Notre-Dame-de-la-Boissière. Its chief industries are tanning, and manufactures of blankets and hats; its commerce is for the most part in cattle, wine, wool, and hemp. Pop. (1872) 5564. C. was stormed in 1870 by the Germans.

CHÂTEAU-GON'TIER, a town of France, department of Mayenne, on the right bank of the river of the same name, 17 miles S.E. of Laval. Its most interesting buildings are the Church de la Trinité, erected in the 17th c., the ancient Chapel des Ursulines, remarkable for its fine stained windows, and the Church of St Jean. C. has cornmills, tanneries, potteries, and manufactures of linens, woollens, serge, &c., and in its vicinity are mineral springs. Pop. (1872) 6371.

CHÂTEAU-MARGAUX, a beautiful castle near the village of Margaux, in the department of the Gironde, E. of Castelnau de Medoc, on the left bank of the river Gironde, 14 miles below Bordeaux. It is famous for its vineyards, which yield one of the finest class of clarets.

CHÂTEAUNEUF, a village of France, department of Lozère, 14 miles N.E. of Mende, pop. (1872) 393. It is historically interesting for the touching incident connected with its surrender by the English governor in 1380 to the dead Du Guesclin, the former laying his sword and keys on the bier of the latter. Here also, on 18th November 1870, the Germans defeated a superior force of French Mobiles.

CHÂTEAUROUX, a town of France, department of Indre, on the left bank of the river Indre, and a station on the Paris and Bordeaux Railway, 145 miles S.W. of the former city. The town-hall occupies the site of the old castle, erected in the 10th c., and of which only a tower remains. C. manufactures and trades in woollens, cottons, hosiery, paper, hardware, leather, tobacco, &c., and has a considerable number of hands engaged in working lithographic stones. Pop. (1872) 14,893.

CHÂTELLERAULT, a town of France, department of Vienne, 20 miles N.N.E. of Poitiers, on the right bank of the Vienne, and connected with a suburb on the opposite bank by a stone bridge, having a castellated gateway, built by Sully, with four massive towers. Cutlery is extensively carried on, lace is manufactured, and there are bleaching-grounds for linen. The river-port gives rise to a large trade in the produce of the district.

Pop. (1872) 13,019. The Duke of Hamilton takes the title of Duke of C. from this place, the duchy having been granted to James Hamilton, Regent of Scotland, by Henri II. in 1548.

CHÂTILLON-SUR-SEINE, a town of France, department of Cote-d'Or, on the Seine, 45 miles N.N.W. of Dijon, with which it is connected by railway. It has a church of the 10th c., and large manufactures of cloth, iron, paper, &c., and a trade in timber and lithographic stones. The allied sovereigns held a congress here, February 5 to March 19, 1814, to negotiate terms of peace with Napoleon. Pop. (1872) 4586.

Chateau'briand, François Auguste, Vicomte de, born at St Malo, in Bretagne, 14th September 1768, the youngest of ten children in an aristocratic family. He was first destined for the marine service, and educated at the Colleges of Dôle and Rennes; then for the Church, for which he studied at Dinan; but finally entered the army, from which, after being presented at court in 1787, he retired to his father's estate of Combourg. After witnessing the outbreak of the Revolution, C. set sail for America, with a view to discovering the N.W. Passage. He saw the Canadas and some Indian tribes, when the news of the King's disaster at Varennes recalled him to France. After marrying Mademoiselle de Lavigne, to whom he did not profess to be attached, he joined the Prussian army before Thionville, where he was left for dead in the trenches. He then came in bad health and great poverty to London. While supporting himself by teaching and translations, he allowed one of his pupils, Miss Ives, to fall in love with him. In 1797 appeared his *Essai sur les Révolutions Anciennes et Modernes*, a work written in a sceptical and pessimist spirit, and concluding against revolutions as useless, though made necessary by human passion. The deaths of his mother and sister made C. a Christian: he says, 'J'ai pleuré et j'ai cru.' In 1800 he returned to Paris under a false passport, which called him Lassaigne, and next year described his religious position in *Atala*, which had enormous success all over Europe. It was followed by *René*, the story of a youth who seeks for peace of mind among savage tribes, and the *Génie du Christianisme*, which is written to show that Christianity is the most beautiful, the most sublime, the most favourable to liberty, arts, and letters, of all religions; and that to it is due all modern civilisation, from agriculture and charity to abstract science and literary taste. This book, half-melancholy, half-enthusiastic, altogether mystical and almost irrational, found a ready audience at a time of so much sorrow and uncertainty. The love of nature, in which C. was preceded only by Rousseau and Bernardin de St Pierre, contributed to its success. The book obtained for C. two diplomatic appointments, which, however, he resigned on hearing of the judicial murder of the Duc d'Enghien. In 1806–7 he made a pilgrimage through Greece, Palestine, and Spain, of which the fruits were his chief work, *Les Martyrs*, a prose epic of the time of the Diocletian persecutions, in which he wishes to set off the new faith against the corruptions of Paganism and the shortcomings of heathen wisdom; and *Le Dernier des Abencerages*, remarkable for its beautiful word-pictures of the Alhambra, &c. C. published in 1814 a passionate pamphlet, *De Bonaparte et des Bourbons*, which Louis XVIII. said was worth an army to the Restoration. C. enjoyed the title of Minister of State; but, as an ultra-royalist, he savagely attacked the constitutional Decazes in the *Conservateur*. After attending the Congress of Verona, where the Spanish invasion question was discussed, and acting as Minister of Foreign Affairs under Villèle, C. became a Liberal writer in the *Journal des Débâts*. At the Revolution of 1830, however, he showed Legitimist colours, refusing to take the oath to Louis Philippe, thus forfeiting a seat in the Chamber of Peers and a large pension. He was even prosecuted for sedition. Down to his death, 4th July 1848, C. was half-republican, half-royalist, always a man of sentiment, not of intelligible principle. He left behind him a monument of sickly egotism in *Mémoires d'outre Tombe*. His old age, though brightened by the society of Mademoiselle Récamier and Béranger, was consumed by doubts about his own reputation. C. will always remain a proof of what literary genius without strong conviction can accomplish. Of the numerous editions of his works the best is that by Sainte-Beuve (12 vols. Par. 1859–60). See Marin's *Histoire de la Vie et des Ouvrages de M. de Châteaubriand* (2 vols. Par. 1833); Desnoiresterres *Châteaubriand et son Époque* in *La Semaine* (20th and 27th August 1848), &c. Most of the great French critics and journalists have attempted to analyse and estimate C.

Chatelet-Lomont, Gabrielle Emilie, Marquise du, a celebrated French woman of letters, daughter of the Baron de Breteuil, was born at Paris, 17th December 1706. Under her father she studied Latin, English, and Italian, and at fifteen undertook a translation of Virgil. At an early age she was married to the Marquis du Châtelet-Lomont, but in 1733 she formed a *liaison* with Voltaire, which was maintained for fifteen years. The lovers retired to Cirey, where they alternately studied, quarrelled, and were reconciled, till in 1747 the marchioness was captivated by the assiduities of M. de St Lambert, a captain in the regiment of the Lorraine Guards, who was destined to be in turn the successful rival both of Voltaire and Rousseau. The result of this intimacy was the birth of a child at Lunéville, followed on the sixth day after (September 10, 1749) by the death of the mother. Of C., Carlyle says, that she was 'a woman, not merely immodest, but without the slightest fig-leaf of common decency remaining;' yet he considers it a legitimate psychological speculation how far she might still have had moral worth as a woma-. She was an eager and successful student of mathematics and the physical sciences. Among her works are *Dissertations sur la Nature et la Propagation du Feu* (Par. 1744, 8vo); *Institutions de Physique* (Par. 1740); and her translation of Newton's *Principia*, not published till 1756, seven years after her death.

Chatham (Old Eng. *Cetcham* or *Cætham*, 'the village of cottages'?), a strongly fortified town in the county of Kent, and one of the chief naval arsenals of Britain, on the right bank of the Medway, 30 miles E.S.E. of London by railway. It is a meanly-built town, but is defended by a series of detached forts, which also form a flank defence of the metropolis. Among the principal buildings are Fort Pitt (a combined fort and military hospital), an extensive arsenal, large barracks for the naval and military forces and engineers, and extensive depôts and magazines. The Government shipbuilding establishment is situated at Brompton village, on the estuary of the Medwin, about half a mile below C., covers an area of some 100 acres, and includes building-slips, floating-docks, and sawmills on the largest scale. It is provided with Brunel blockmaking machinery, and also with a metal mill for preparing copper plates, bolts, &c. A captain-superintendent is in control of the dockyard, and has a salary of £700; under him there are various officers and clerks, whose salaries range from £200 to £80. In 1874 his estimates returned the number of shipwrights and other workmen in and about the dockyards at 2974, at an average weekly wage of 24s. each. Pop. (1871) 45,792. C. sends one member to Parliament. The town is a place of considerable antiquity, and from remains found on the spot the Romans appear to have had a cemetery here. The dockyard was established in the reign of Elizabeth, and in 1667 a Dutch fleet of seventeen vessels, under Van Ghent, De Ruyter's vice-admiral, sailed up the Medwin and set fire to the shipping. New buildings were erected between 1757 and 1805, and since the latter date great extensions of the marine resources of C. have been made.

Chatham Islands, or **Broughton Archipelago,** a group of islands in the S. Pacific, nearly 400 miles E. of the province of Canterbury in New Zealand, were discovered and named by Lieutenant Broughton in 1791. Their total area is about 180 sq. miles. The largest is C. Island or Warekauri; lesser islands are Pitt or Kangihaude, and Cornwallis or Rangiaura. The soil on the whole is fertile, and favourable to the cultivation of wheat; horses and oxen thrive, but there is no timber of any size. The natives, though a robust and vigorous race resembling the Maories, are fast dying out. An English and German mission are maintained here.

Chatham, William Pitt, Earl of, one of Britain's greatest statesmen and orators, was born November 15, 1708. His father, Robert Pitt, of Boconnoc in Cornwall, was originally a country gentleman, and both father and grandfather (the latter had been Governor of Madras) sat in the House of Commons for Old Sarum. Pitt studied at Eton and Trinity College, Oxford, and after travelling on the Continent, obtained a cornetcy in the Blues. He did not, however, find his true vocation till, on his elder brother Thomas, being returned both for Oakhampton and Old Sarum, resigning the latter, he took the vacant place. In Parliament he espoused the side of Frederick, Prince of Wales, and by his eloquence and bitterness soon obtained the position of leader of the 'Boys,' as the younger Whigs, and opponents of Sir Robert Walpole, were then called. On the

fall of Walpole, Pitt, although much disliked by the King, became a subordinate member of the Broad Bottom administration, and held the post of Paymaster-General. In 1756 Pitt, who had become the head of the Opposition to the Newcastle administration that had been formed on the death of Henry Pelham, and who was so popular that he was styled 'the Great Commoner,' was made Secretary of State in November 1756, and in reality head of the Government. Driven for a time from power, he was recalled, in answer to the demand of the people, in June 1757, and although the Duke of Newcastle was Premier, Pitt, who had the management of foreign affairs, was the real force of the administration. Under him, and mainly on account of the energy he infused into every department of the state, Britain rose to a position she had never, since the time of Cromwell, held among the nations. Everywhere British arms were victorious; in Canada and India, under Wolfe and Clive, great possessions were snatched from the French, and at Minden and Quiberon, the power of France in Europe was shattered. 'We are forced,' said Horace Walpole, 'to ask every morning what victory there is, for fear of missing one.' Pitt, however, found himself compelled to resign office after the accession of George III., then under the advice of Lord Bute, and more immediately because the majority of the Cabinet refused to declare war against Spain. A pension of £3000 a year, however, was granted him, and his wife was created Baroness C. Till 1766 he remained out of office, when he was again called to form a ministry, which he did, going to the House of Lords as Earl of C. This second administration was, however, far from a success, and C., broken in health, and to appearance temporarily insane, resigned office in 1768. Although he never again was a minister, C. to the end of his life took a keen interest in the affairs of his country. He opposed the policy of the Government towards the American colonies, advocating conciliation; and yet it was after he had delivered a powerful address against a motion by the Duke of Richmond for making peace with America, then in alliance with France, that he fell back into the arms of his friends, and had to be carried dying from the House of Lords. His death took place May 11, 1778. The country honoured him with a public funeral in Westminster Abbey; the sum of £20,000 was voted to pay his debts; and a pension of £4000 a year was settled on his descendants. C. was one of the greatest of British orators, patriots, and statesmen. Besides his actual achievements, which covered his country with glory, his foresight was shown in his proposals for parliamentary reform, for the direct government of India, and in his directing his foreign policy towards the preservation of Prussia, while it has been said of him with truth, that 'Time has approved almost all his greater struggles—his defence of the liberty of the subject against arbitrary imprisonment under "general warrants," of the liberty of the press against Lord Mansfield, of the rights of the constituencies against the House of Commons, of the constitutional rights of America against England itself.' In public life C. was purity itself. As an orator, his passionate eloquence and sarcasm, aided by a commanding presence, made him more feared than any of his contemporaries. His chief faults were intense pride, pomposity, and a tendency to theatrical airs even in private life, though he was a most affectionate husband. See the *C. Papers* (4 vols. Lond. 1838-40); his Letters to his nephew, Lord Camelford (Lond. 1804); F. Thackeray's *Life of C.* (2 vols. Lond. 1827); and Macaulay's *Essays*.

Chat Moss, a peat-bog in Lancashire between Liverpool and Manchester. It is composed entirely of decayed vegetable matter, is about 12 miles square, and varies in depth from 10 to 30 feet. A portion of it was reclaimed about the beginning of the present century by Mr Roscoe of Liverpool; but it is most celebrated in connection with the Liverpool and Manchester Railway, which the engineering skill of George Stephenson successfully carried across the yielding surface in 1829.

Chats'worth, in Derbyshire, the private seat of the Duke of Devonshire, stands on the Derwent, 20 miles N. by W. of Derby. It is a splendid palace, of quadrangular design, having a façade 720 feet long, and being surrounded by grounds 9 miles in circuit, and only inferior to those of Versailles. Its conservatory is the finest in Europe, and the mansion itself contains famous art collections. The estate was originally a grant from William the Conqueror to his natural son William Peveril, and was held in Elizabeth's time by Sir W. Cavendish, who began (1570) the erection of the mansion, in which Mary Queen of Scots was imprisoned for some years. The old pile was included in the present edifice, which was designed by Wren and Talman, and built by the first Duke of Devonshire (1687-1706), and to which the N. wing was added since 1820.

Chattahoo'chee. See APPALACHICOLA.

Chatt'els, in English law, include all property, movable or immovable, which is not freehold, copyhold, or inheritable. They are either real or personal. Real C., or chattel interests, are interests or minor estates taken out of greater, as leases for terms of years. Personal C. are all property not connected with the freehold.

Chatt'erer (*Ampelidæ*), the name of a large family of Insessorial birds belonging to the Dentirostral section of that order, and divided into a number of sub-families, including such birds as the Drongo-shrikes, caterpillar-eaters, fruit crows, true chatterers (*Ampelinæ*), manakins, &c. The Bohemian C., or common waxwing (*Ampelis garrula*), is a familiar example of the typical genus. These birds possess short, broad bills, rounded wings, short tarsi, and curved claws.


Chatterer.

Chatt'erton, Thomas, the boy-poet, was born at Bristol, November 20, 1752. His father, sexton at Redcliffe Church and master of a charity-school, died before C.'s birth. At school he was considered slow, but early manifested a taste for antiquities, which was first excited by a black-letter Bible belonging to his mother. Bound apprentice to an attorney at the age of fourteen, in this situation he endured much misery, solacing himself, however, by writing poetry and studying heraldry. In 1768, on the opening of Bristol New Bridge, he composed the *Description of the Fryars first passing over the Old Bridge, taken from an Antient Manuscript.* Before this, C. had written the celebrated *De Bergham Pedigree*, purporting to trace the descent of a tradesman called Burgham. These and other MSS., such as the *Romaunte of the Cnyghte*, and Thomas Rowley's *Sermon*, he declared were found in 'Canynge's Cofre,' an old chest taken from the muniment-room of Redcliffe Church. After this he sent to Walpole, for his *History of British Painters*, a manuscript entitled *The Ryse of Peyncteyne in England*, and also an account of noted 'carvellers and peyncters' of Bristol. Walpole, at first deceived, afterwards suspected forgery, and the correspondence was broken off. His three years of legal servitude over, C. proceeded to London, and was soon engaged in party-writing for the newspapers and magazines, taking the side of the Opposition. His industry was unceasing, and success at first made him look for a 'glorious prospect.' But this soon died away, for pasquinades, satires, burlesques, political letters, did not bring the means of life. Reduced at length to the extremity of despair and want, he sought the post of surgeon's-mate in an African ship. Even this poor chance failed him. These reverses and the pangs of poverty acting on a natural predisposition, drove this lost genius to suicide, August 25, 1770. His remains were laid in the burying-ground of Shoe-Lane Workhouse. In the tragic sadness of his fate, and the precocity of his mental power, C. is without parallel in English literature. His short span of eighteen years was wondrously rich in results. Among his works are *Ella*, a tragedy; *Ode to Ella*; *Battle of Hastings*; *The Tournament*; and *Execution of Sir Charles Bawdin*. The 'forged' poems are undoubtedly superior to the others; but such a satire as *Kew Gardens*, compared with the *Ode to Liberty* and the *Bristow Tragedy*, shows strikingly his varied powers. It is a moot point whether his maturity would have fully realised the promise of youth; but that a longer life would have developed his genius can be clearly discerned from the works he has left. It may here be noted that C.'s knowledge of Old, or even Middle English, was of the very slightest; and it seems almost incredible that

anybody should have ever supposed the forgeries to be genuine. Neither metres, nor rhymes, nor words, nor spelling belong to the 15th c., or indeed to any other century. See *The Poetical Works of Thomas C., with an Essay on the Rowley Poems, by the Rev. Walter W. Skeat, M.A., and a Memoir by Edward Bell, M.A.* (2 vols. Lond. 1875).

Chau'cer, Geoffrey, the first great English poet, was born probably about 1340. His father, John C., was a London vintner. It is not known where C. was educated. In 1359 he accompanied Edward III.'s army into France, was taken prisoner, and was ransomed in 1360. About 1366 he married a certain Philippa, a lady in attendance on the Queen, and shortly afterwards obtained an annual grant of 20 marks as a valet of the King's chamber. He was sent to Genoa, in 1372, to arrange a commercial treaty, and was made comptroller of the wool customs in London in 1374. About this time his income was also increased by the custody of a minor's estate. Between 1377 and 1384 he was employed on important missions in France, Flanders, and Lombardy. In 1382 he became comptroller of the petty customs, and was sent to Parliament as a Knight of Kent in 1386. But the same year saw the downfall of his patron John of Gaunt, and the consequent dismissal of the poet from all his offices. His fortunes rose with the reviving influence of John of Gaunt in 1389. He was made clerk of the King's works; obtained, in 1394, an annuity of £20, and a pension of 40 marks on the accession of Henry IV. in 1399. He died, probably at his house in Westminster, in 1400.

Traveller, soldier, courtier, diplomatist, member of Parliament, he passed his life among the most various and splendid aspects of the society which he has so vividly and minutely portrayed.

His literary career has been divided by Mr Furnivall into four periods—1. 1367–68, *Pity*; 1369, *Death of Blaunche*, more commonly known as *The Boke of the Duchesse*. 2. 1373, *Parliament of Fowles; Compleynte of Mars; Anelida and Arcite; Troylus; Adam Scrivener;* 1384, *Hous of Fame.* 3. 1386, *Legende of Good Women;* 1388, *Prologue to Canterbury Tales.* 4. 1391, *Astrolabe; Compleynte of Venus;* 1393–99, *Envoy to Skogan; Marriage; Gentleness; Lack of Steadfastness; Fortune; Purse.* The *Canterbury Tales* were begun in 1373 with the second *Nonnes Tale*, and were left unfinished in 1400. In this list we miss the *Court of Love*, the *Flower and the Leaf*, beautiful symbolical poems, and the *Romance of the Rose*, a vivid translation of about a third of the *Roman de la Rose* of Guillaume de Lorris and Jean de Meung. Some scholars have denied these works to be C.'s because they do not agree with a somewhat arbitrary rhyme-test. But there is no other author to whom these poems can be assigned, and it is certain that James I. of Scotland attributed the *Court of Love* to C. C. was at first greatly influenced by the French *trouvères*, but in his *Canterbury Tales* struck out an original form of poetry, substituting the delineation of character and contemporary life for the relation of monotonous and extravagant adventure. He recast and recoloured a number of chivalrous, humorous, and marvellous tales woven in France, Italy, and the East, and gave us in the persons of their imaginary narrators, the Canterbury pilgrims, a representative gallery of society in the 14th c. His characters are not extinct types but sharply defined, living men and women. His verse breathes of spring, and is bright with the splendours of chivalry. His narrative skill is consummate, his tales gliding on with captivating artistic fluency and unobtrusive felicities of phrase. He unites luxuriant invention, and piercing satiric shrewdness with delicate pathos, sunny humour, grave love of truth, and refreshing delight in nature.

The English style of C. marks the beginning of the modern period in our literature. Contrasted with earlier English dialects, his language may be called uninflected, and comparatively few of his expressions have become entirely obsolete. Of modern editions of C., that of Bell (8 vols. Griffin & Co., Lond.) is meritorious for its notes and honest industry, but incomparably the best is that of Morris (6 vols. Bell & Daldy, Lond.), both as regards text, biography, and linguistic criticism. See also Minto's *English Poets*, and the publications of the *C. Society*.

Chaudes-Aigues ('hot springs'), a town of France, department of Cantal, on the Remontalou, 28 miles E.S.E. of Aurillac. Its hot mineral springs (133° to 190° F.) are much used for medicinal purposes, and for discharging grease from the fleeces of sheep. C. has important fairs for the sale of pigs, and a considerable trade in tinwares. Pop. (1872) 1100.

Chaudfontaine ('hot spring'), a village of Belgium, province of Liège, a few miles from the city of Liège, on an island in the Vesdre, and much frequented by visitors in the summer season, on account of its baths and hot springs (104° F.). Pop. (1873) 1393.

Chau'dière, a river and lake of Canada. The river, after a course of 90 miles through the province of Quebec, joins the St Lawrence 7 miles above the city of Quebec. About 2½ miles from its mouth are the Falls of the C.—**Lake C.** is merely an expansion of the river Ottawa. On its S. shore stands the capital of the Dominion of Canada.

Chaumette', Pierre Gaspard, born at Nevers, 24th May 1763, the son of a shoemaker, after a vagabond youth came to Paris in 1789, where he fell under the influence of Camille Desmoulins, and joined the Cordéliers. After haranguing and writing in the most violent journals for three years, he became in 1792 the Procureur of the Commune of Paris, and assumed the fanciful name of Anaxagoras. He established the Revolutionary Tribunal, and his rapid, sonorous eloquence made him influential in all the extreme measures of 1793. He founded the party of Hébertists, who desired to have religious honours paid to the goddess Reason, which was actually done at the *Fête de la Raison*, in which an actress named Maillard took the part of the goddess. With the assistance of Chabot, Clootz, and others, C. induced the Convention to adopt this absurdity. Danton and Robespierre now combined to crush the Hébertists, and C. was executed 13th April 1794.

Chau'mont, an ancient town in the department of Haute Marne, France, on the left bank of the Marne, 141 miles S.E. of Paris. The Church of St John the Baptist is a fine building of the 13th c. C. has manufactures of hosiery, gloves, druggets, &c., wool and cotton spinning-mills, and tanneries. The treaty concluded here against Napoleon by the Allies, March 1, 1814, formed the basis of the Holy Alliance. Pop. (1872) 7984.

Chaun'cey, Charles, the second President of Harvard College, was born in England in 1592, and educated at Westminster School and Trinity College, Cambridge. In 1627 he was made vicar of Ware, became a Puritan, and after being imprisoned and fined, emigrated to New England in 1636, and in 1654 was appointed President of Harvard. In 1659 he published twenty-six sermons on 'Justification.' He died 19th February 1672. C. is the ancestor of all the American Chaunceys, who form a pretty numerous body.—**Chauncey, Charles, D.D.**, great-grandson of the above, was born January 1, 1705. He was minister in Boston in one parish for sixty years, and is the author of various theological works which are still in repute in America. He died February 10, 1787. See *C. Memorials*, by Professor Fowler.

Chau'ny, a town of France, department of Aisne, 19 miles N.W. of Laon. A portion of it is built on the right bank of the Oise, and the remainder on an island in the river. C. has manufactures of sacking, hosiery, and chemicals; bleaching-grounds and tanneries; and a trade in grain, timber, and cattle. Pop. (1872) 8333.

Chausses (Fr., from the Lat. *calceus*, 'a shoe, or covering to the foot'), defence pieces of armour for the legs, worn in the middle ages. They were variously made of banded mail, riveted plates, chain-mail, or padded and quilted cloth, with metal studs. The C. were sometimes laced behind the leg.

Chaux de Fonds, La, a flourishing town in the canton of Neuchâtel, Switzerland, near the French frontier, in a valley 3271 feet above the sea. It is the chief seat of the watchmaking industry in the Jura, employing 12,000 hands, and producing yearly some £400,000 worth of gold and silver watches. There are also important manufactures of mathematical and musical instruments, beer, bijouterie, and lace. The town has extended very rapidly, and is still increasing. Pop. (1870) 19,930, of whom 2300 are Roman Catholics.

Chav'ica, the dried unripe fruit of *C. Roxburghii*, one of the Pepper order, and known in commerce as *long pepper*. It contains an acrid resin, a volatile oil, and an alkaloid—*piperine*. C. is used in much the same way as black pepper, which in its properties it resembles. In India dried slices of it are in repute as a stomachic. *C. officinarum* of the Malay Islands also yields a

similar long pepper. C.-betel is betel-pepper. C. *Siraboa*, mixed with betel-nut and a little lime, is chewed. See BETEL.

Chay Root, Choya, or **Sayan,** a name applied to the root of *Oldenlandia umbellata* (one of the *Cinchonaceæ*), sometimes imported from India for the sake of the colouring matter in the bark, which is employed to dye red, purple, and orange-brown. The same name is also sometimes erroneously given to the roots of *Morinda, tinctoria*, and *citrifolia*, Indian plants of the same order. In C. R., known as Indian madder, some of the Ceylon tribes used at one time to pay their tribute.

Chead'le, a town and parish in Staffordshire, 14 miles N.N.E. of Stafford, in a hollow moorland region. The finest building is a Roman Catholic church, built in 1846 by the Earl of Shrewsbury, at a cost of £60,000. In the neighbourhood are iron-mines, collieries, copper and brass works, &c., which furnish employment to the inhabitants. Pop. (1871) 2929. The parish is mentioned in Domesday Book under the form *Cedla*. About 4 miles distant are the ruins of the Cistercian Abbey of Croxden, founded in 1176.

Check (Fr. *échec*, 'chess'), a cloth variegated with rectangular spaces like a chessboard, which are variously coloured, but are most frequently alternate black and white.

Check'y, or **Chequée** (Fr. *échiquete*), in heraldry, describes a field divided into three or more continuous rows or small squares, tinctured alternately with a metal or fur, and a colour.

Chedd'ar, a village in Somersetshire, at the entrance of a gorge in the Mendip Hills, overhung by walls of cavernous rock, in places rising perpendicularly to the height of several hundred feet. The church has a square tower 100 feet high, and a sculptured stone pulpit. The dairies in the neighbourhood are famous for their cheese. The C. process of cheese-making has now been widely introduced into the great dairy-farms in the S.W. of Scotland. (See CHEESE.) Pop. of parish (1871) 2200.

Chedu'ba, a richly productive island, included in the division of Aracan, British Burmah, lies 20 miles from the coast, and has an area of 250 sq. miles, and a pop. of 9000. It yields large quantities of rice, sugar, tobacco, indigo, hemp, &c., and has mud volcanoes and petroleum springs.

Cheese is the compressed curd or casein of milk prepared for use as human food. In making C., the milk employed is gently heated to a temperature of about 112° F., and a sufficient quantity of rennet or of an acid substance is added to cause coagulation of the casein. Rennet, which is usually employed, is prepared from the lining membrane of the fourth stomach of the calf, which organ must be salted and dried for a year before it or its solution is used. The action of the rennet produces a complete coagulation of the casein, and the separation of the curd from a straw-coloured, clear, liquid whey takes place on 'breaking the curd' by stirring with the hand or any implement. The greater part of the whey can be drained off, and the curd rendered rather dry and crumbly in the vessel, after which it is submitted to a further draining in a linen cloth, and pressed in the C.-press. The curd is then again broken up, and mixed with the proper amount of salt, placed in a clean cloth into the C.-vat or chessart, which has the shape the C. is intended to take, and submitted to a prolonged pressure in the C.-press to expel the last traces of whey. During this pressure the C. is turned occasionally. When perfectly pressed, the cheeses are put away on shelves in a cool apartment to harden and ripen, and in C. of good quality a gradual moulding should ensue. Four kinds of C. are found in commerce :—(1) cream C.; (2) C. made of sweet milk with a proportion of cream added; (3) sweet-milk C.; and (4) skimmed-milk C. The first variety, cream C., is made in Yorkshire and Neufchatel, keeps only a short time, and, of course, is soft and very fat. The best ordinary C. belongs to the second class, and comprises Stilton, Double Gloucester, Roquefort, Gorgonzola, and Cheddar. Of the third class are Gloucester (single), Wiltshire, American, and Dunlop; and Parmesan and Dutch C. belong to the fourth class, which also includes most of the ordinary country C. made in Scotland. Gouda C. of Holland is made with curd formed by the action of hydrochloric acid on milk, and to this it owes its freedom from mites and its pungency. Parmesan C. owes its peculiar rich flavour to the sweet herbage on which the cows are fed along the banks of the Po. Swiss C. (Schapzieger and Gruyère) is flavoured with fragrant herbs, and made in cheeses of 40 to 60 lbs. The following table exhibits the composition of several varieties :—

	Chester.	Roquefort.	Dutch.	Gruyère.	Parmesan.
Water per 100 parts .	30·39	26·53	41·41	32·05	30·31
Nitrogen " .	5·56	5·07	4·10	5·40	5·48
Fat " .	25·41	32·31	25·06	28·40	21·68
Ash " .	4·78	4·45	6·21	4·79	7·09

C. is called on to discharge two functions in the economy of food. It is a most nutritive but somewhat indigestible article when the commoner qualities form an article of diet, as they frequently do among the labouring population. The richer varieties of C. are eaten in very small quantities after meals, and they, when ripe, are found to materially promote the process of digestion. Great improvement has taken place of late years in the manufacture of this article, especially in Scotland, where annual competitions take place among the makers. The Kilmarnock 'Cheese Show' is one of the largest in the world. The whole S.W. of Scotland is in the field, and the value of the C. exhibited is often over £20,000.

Cheese-Hopper (*Piophila casei*), the name given to the larva of a fly (belonging to the order *Diptera* and family *Muscidæ*), owing to its habit of bending the body into a loop, and of suddenly straightening it in order to spring. It exists in cheeses, the perfect fly being of minute size (1½ lines in length), of a black colour, with red feelers and forehead. The bacon-beetle (see DERMESTES) and another fly (*Musca corvina*) also deposit their eggs in cheese, and thus cause much waste in dairies.

Cheese-Mite (*Acarus domesticus*), a species of *Acaridæ*, or true mites, belonging to the class *Arachnida* (q. v.), and so named from its being mainly found in cheese and like substances. It possesses an oval-shaped body covered with prominent bristles, eight legs, and a mouth provided with mandibles or jaws. In decaying cheese the C.-M. is sometimes found in immense numbers. Reproduction is effected very quickly. No defined circulatory or respiratory organs exist in the animal, in which also the eyes are of simple character.

Chee'tah, or **Hunting Leopard** (*Felis jubata* or *Guepardа jubata*), a species of carnivorous mammalia, generally regarded as allied to the panthers and leopards, and found in India, Persia, Sumatra, Senegal, the Cape, and other parts of Africa. This animal exceeds the ordinary leopard in size. The limbs are relatively longer than in the leopard, as are also the feet; the claws are blunt, and only partially retractile. The head is small in proportion to the animal's size and height, and a short mane of stiff hairs exists on the neck. The ears are short and rounded, the muzzle being truncated and short. The hair on the front part of the body and lower edges of the jaws is rough and elongated, as is also the fur of the hinder part of the abdomen. The colours are like those of the leopard, the general hue being, however, of a deeper fawn. The fur is marked on the body and limbs by round black spots. The face is striped, and a bold black streak runs from each eye to the angle of the mouth.

The C. is trained in India and Persia to hunt such game as antelopes, deer, &c. It is kept blindfolded until within sight of the quarry, when it is let slip, and stealthily approaches the prey. It then bounds in upon the antelopes, but if unsuccessful in its first onslaught, it makes no attempt to follow, but returns to the hunter. The name *Youze* is also given to the C. which under domestication may become tame and familiar.

Cheiran'thus. See WALLFLOWER.

Cheirol'epis, a genus of extinct Ganoid fishes, generally assigned to the division *Lepidosteidæ* of that order. The fossil remains of this genus occur in the Devonian or Old Red Sandstone formations. The head was of large size, and the body covered by small ganoid scales of lozenge shape. Each fin had its first ray existing as a strong spine, and the pectoral and ventral fins were well developed and scaly.

Cheir'omancy, or **Chir'omancy** (Gr. *cheir*, 'the hand,' and *manteia*, 'divination'), palmistry, a mode of forecasting the destiny of an individual from the lines of the hand. It was known to the ancients. Traces of it are visible in Aristotle. Artemidorus,

however, in his *Dream Book*, was the first to give anything like a connected or systematic view of the subject. In the middle ages it was still more developed and associated with astronomy. Cardan, Paracelsus, Porta, and other dubious savans, sought to give it a scientific basis. But with the spread of knowledge it gradually lost its hold on the human mind, and is now professed only by gipsies.

Cheir'omys. See AYE-AYE.

Chei'ron, represented by Homer (Il. xi. 831) as the wisest and most humane of the Centaurs (q. v.); the instructor of Achilles, Jason, and Æsculapius; skilled in hunting, music, medicine, and prophecy; and throughout life and in his death a splendid example of self-sacrifice. The young Achilles, and sometimes the Erotes, or Loves, appear in existing representations riding on his back.

Cheironec'tes, a genus of Marsupial mammals represented by the Yapock or Yapock-opossum of Brazil (*C. Yapock*), and allied to the opossums, from which, however, it is distinguished by its semi-aquatic habits. The hind-feet are webbed, the fore-feet being hand-like in conformation, and webbed only to the first joint of the digits. The fur is of a pale grey colour, banded with sooty-black. The C. possesses cheek-pouches, the food consisting chiefly of insects and crustaceans. The average length is 2 feet.

Cheirop'tera. See BAT.

Cheiroste'mon, a genus of plants of the natural order *Sterculiaceæ*. *C. platanoides* is the hand-plant of Mexico, so named from the anthers and style of the flowers resembling in their arrangement a hand furnished with long claws. It was the *Macpalxochitlquahuitl* of the ancient Mexicans. It is found in forests near the city of Guatemala.

Cheirothe'rium ('hand-beast'), the name formerly given by Kaup to the ideal animal which was supposed to have made certain footprints seen in rocks of Triassic age in Britain and in Germany. The fossil remains of the actual animal were afterwards discovered, and the name *Labyrinthodon* (q. v.) substituted for that of C.

Cheke, Sir John, one of the ardent scholars who forwarded the revival of classical literature in England in the 16th c., was born at Cambridge, 16th June 1514, and studied at St John's College, Cambridge, where he became professor, and introduced a new method of pronouncing Greek, which, however, he was ordered to discard by Bishop Gardiner, the chancellor of the university. Among his pupils were William Cecil, afterwards Lord Burleigh, and Roger Ascham. In 1544 he became tutor to Prince Edward, and was made a canon of King's College (now Christ Church), Cambridge. When his pupil ascended the throne, C. got various grants of lands and rents, was made Provost of King's College (1548), knighted (1551), and made a secretary of state (1553). Upon Mary's accession he was committed to the Tower on a charge of treason, but soon after obtained his liberty, went abroad, and taught Greek at Strasburg; but in 1556 was seized by the orders of Philip while travelling in Belgium, conveyed to England, and again imprisoned. In an evil moment C. abjured Protestantism to escape the stake, and grief at this apostasy seems to have hastened his death, 13th September 1557. C. wrote a considerable number of works, partly scholastic, partly theological; but they have now no place in literature. For a list of these, see Cooper's *Athenæ Cantabrigienses*.

Chelæ, Chelic'eræ. The name *chelæ* is given to the largely developed 'nipping-claws' seen in such crustaceans as crabs, lobsters, &c., and also in the scorpions, in which latter forms the *chelæ* are formed by the *maxillary palpi* or appendages of the lower jaws. The *chelicera* of the scorpions are formed by the pincer-like extremities of the mandibles or larger jaws. The *chelicera* are, in short, the diminutives of the larger *chelæ*.

Che'lifer. See BOOK SCORPION.

Chelms'ford (called in Domesday Book *Celmeresforde*), the capital of Essex, on the Chelmer, near its junction with the Cann, and about the heart of the county, 29 miles N.E. of London by railway. It has tanneries, cornmills, coachworks, &c., and a considerable river trade in agricultural produce. The river, which separates here into two branches, surrounding an islet called Mesopotamia, is crossed by several bridges. C. possesses various handsome buildings, and a grammar-school founded by Edward VI. Pop. (1871) 9318.

Chelo'nia (Gr. *chelōne*, 'a tortoise'), the class of *Reptilia* or reptiles to which the tortoises and turtles belong. It is primarily distinguished by the fact that the true or endoskeleton combines with the outer or exoskeleton to form a bony case in which the body is enclosed. This case consists of a *back* or *carapace*, formed by the expanded spines of the dorsal vertebræ, and by the flattened and amalgamated ribs, generally eight in number on each side. Occasionally (as in the soft tortoises) the ribs may be imperfectly united towards their extremities, and gaps may thus be left in the otherwise solid structure. The sides of the structure are formed by *marginal plates*, which may either be bones developed by the skin (*dermal ossifications*), or be the ossified ends or cartilages of the ribs. The floor of the body or box is formed by nine pieces forming the *plastron*, which Owen thinks is a greatly developed breastbone, but other naturalists regard it as merely composed of dermal or skin ossifications; the C. in this latter view being destitute of a breastbone. The carapace and plastron are both covered by horny plates, which in the hawk's-bill turtle (*C. imbricata*) constitute the *tortoise-shell* of commerce. The dorsal vertebræ are thus immovably connected together, those of the neck and tail being alone mobile. The bones of the shoulder and pelvis, supporting the fore and hind limbs respectively, are contained *within* the ribs or carapace, instead of, as in all other vertebrata, existing *outside* the ribs. Clavicles or collar-bones are absent in Chelonians. Four limbs are developed. The bones of the skull are firmly ossified together, the halves or *rami* of the lower jaw being firmly united in front. No teeth exist, the jaws being sheathed in horn, like those of Birds (q. v.). In some (soft tortoises, &c.) fleshy lips may be present. The tongue is thick and fleshy; the heart is three-chambered, and the lungs are large and voluminous. These forms *swallow* air in breathing, like the frogs, the fixed nature of the chest rendering respiratory movements impossible of performance. A large urinary bladder exists, the anal opening or vent being circular or of longitudinal shape. These forms are cold-blooded and of slow movements; they hybernate in winter, may pass long periods without food, and will exhibit signs of vitality for a lengthened time after decapitation. They are divided into the *Cheloniidæ* or Turtles (q. v.), the *Trionycidæ* (soft tortoises and terrapins), and the *Testudinidæ* (Tortoises) (q. v.).

Fossil representatives of this group occur doubtfully first in the Permian rocks, where their footprints occur (*e.g.*, *Chelichnus Duncani* of Jardine); but in the Oolite rocks turtle remains are found, and the Eocene period is rich in Chelonian fossils. The Tertiary deposits of the Sewalik Hills of Hindostan afford the remains of a gigantic chelonian averaging from 18 to 20 feet long, and to which the appropriate name of *Colossochelys Atlas* has been given.

Chel'sea (originally *Ceoles-ige*, 'the island of ships'?) Middlesex, now a suburb of London, with a pop. in 1871 of 258,050. In the 16th c. it was the residence of Queen Catherine Parr, Sir Thomas More, the Princess Elizabeth, Sir Hans Sloane, &c. Even in the 17th and 18th centuries it was still a village 2 miles from London, the residence of many of the nobility and gentry; and was famous for its Ranelagh Gardens, the favourite resort of pleasure-seekers from the capital. C. has numerous churches and chapels; that of St Luke (1824) cost £40,000; another, a fine old brick structure near the river, is full of monuments and brasses to historic personages. It has also a training college for schoolmasters, and another for schoolmistresses; two fine suspension bridges; a Royal Military Asylum for the education of the sons of soldiers; Botanic Gardens (the gift of Sir Hans Sloane, and one of the earliest botanic gardens in England); and the somewhat notorious Cremorne Gardens; but the renown of C. is mainly due to its famous hospital.

Chelsea Hospital, for invalids or superannuated soldiers, has accommodation for about 600 men, besides officers; and attached to it there are gardens and exercise grounds, covering about 40 acres. The governing body consists of a Board of Commissioners under the Presidency of the Paymaster-General, which meets weekly. The inmates are known as *in-pensioners*, in con-

tradistinction to *out-pensioners*, the proportion of the latter to the former being in the ratio of 100 to 1. The in-pensioners have board, lodgings, clothing, medical attendance, &c., and a graduated scale of weekly payments, according to the status each held in the army, colour-sergeants receiving 5s. 3d. and a private 7d. The out-pensioners receive payments for life at the rate of 1½d. (for West Indians) to 3s. 7½d. per day. The cost of the hospital for 1875–76 is estimated at about £28,000. Previous to the funeral of the late Duke of Wellington, November 18, 1852, the body lay in state for a few days in C. H. The building was begun in 1609 by Dr Sutcliffe, Dean of Exeter, as a theological college, and was styled in its charter, 'King James's College at Chelsea.' Charles II. built on its site the present Royal Hospital, of which the architect was Sir Christopher Wren, and the cost £150,000. There is an annual parliamentary grant for the maintenance of the hospital.

Chel'tenham, a parliamentary borough and market-town, Gloucestershire, 8 miles N.E. of Gloucester, on the river Chelt, from which it derives its name. Its prosperity originated in its mineral springs, which were accidentally discovered in 1716. In 1788, George III. having derived much benefit from their use, C. at once became a fashionable resort. It has now magnificent promenades, and numerous handsome squares, crescents, and terraces; while two suburbs have been recently formed of villas and first-class residences. To each of the spas a pump-room is attached. C. has an endowed grammar-school, a proprietary college, which holds a very high place among similar establishments, a ladies' college, and a training-college for male and female teachers. It returns one member to Parliament. Pop. (1871) 44,519.

Chemical Affinity. See AFFINITY, CHEMICAL.

Chemistry, which at present holds such an important and prominent position among the useful and exact sciences, and which has done so much for the good of mankind, and for the advancement of science generally, had for its origin the purely selfish desire for wealth.

History.—The alchemists, who were the fathers of the science, laboured to discover the philosopher's stone—a substance which, by contact with other bodies, should convert them into gold; and later they sought for the *elixir vitæ*, to give them perpetual youth, and by that means ensure an unlimited period during which to enjoy their riches. (See ALCHEMY.) Such were the chief aims of alchemy—an art (for it cannot be called a science) which was first cultivated in the East, either by the Arabs or Greeks, and gradually extended to Spain and Africa, Germany, Italy, France, and England. In thus censuring alchemy, however, it must not be forgotten that many of its devotees were not animated by selfish motives, but, on the contrary, laboured to turn their discoveries to practical account for the good of their fellows, chiefly by employing the substances which their researches had brought to light as medicines; and indeed Geber, one of the earliest of the alchemists, appears to have made this his special object. To the alchemists we are indebted for the knowledge of a great many substances which their experiments elicited, and in many cases for the discovery of the chief properties of these substances, but it cannot be said that they left us any important theories. Theory began to dawn on chemists in the 17th c., and with its light C. rapidly assumed the proportion of a science, and developed with a rapidity unsurpassed by any other branch of knowledge. Johann Joachim Beccher and Georg Ernst Stahl were the first to introduce into C. a comprehensive and rational theory of the nature and properties of matter, and to refer them to a common principle. This theory originated with Beccher, but was extended and enlarged by Stahl, to whom most of the credit of its introduction was given; so much so, indeed, that it was styled the 'Stahlian' theory, though it is now better remembered as the 'Phlogiston' theory. Its principle was, that all combustible bodies were compounds containing a common constituent which was dissipated during combustion, leaving either a *calx* or an *acid* as residue, according to the nature of the combustible. This common constituent was believed to be a material substance, and to constitute the principle of combustion. It received from Stahl the name of *phlogiston*. Incombustible bodies were at first but little considered, but subsequently they were believed to be the calces or residues of substances which had undergone the process of combustion. Phlogiston, it was believed could in many cases be made to combine with a calx or acid, and so produce the original substance. Thus, if tin be sufficiently heated it smoulders away, and is eventually converted into a dirty white earthy powder or calx. If this calx be now mixed with charcoal and strongly heated, some of the charcoal disappears (its phlogiston being yielded up to the calx), and metallic tin is reformed. Chemists of the time had excessively vague ideas, if any, concerning the nature of phlogiston, but after the discovery of hydrogen they appear to have regarded that body as isolated phlogiston, an idea which must have appeared very plausible, considering the ease with which hydrogen burns, leaving no fixed residue, and the readiness with which many metals can be reformed from their calces when the latter are heated in a stream of it.

During the greater part of the 18th c. this theory reigned supreme, and was advocated and extended by some of the ablest men that have laboured in the cause of chemical science. Pre-eminent among them were Priestly, Cavendish, Black, Scheele, and Bergman,—philosophers to whom the world is largely indebted for their discoveries. It would take up too much time to enumerate all the substances brought to light by their researches; suffice it to say, that Priestly discovered oxygen, Cavendish first prepared hydrogen, and demonstrated the composition of water. Black discovered carbonic acid gas, and explained the difference between caustic and mild alcalies. Scheele first prepared chlorine, tartaric, citric, malic, oxalic, and gallic acids, and many important mineral acids; whilst to Bergman belongs the credit of having first introduced quantitative analysis into chemical science, and by that means prepared the way for the atomic theory.

Well as the phlogiston theory explained the leading properties of most substances known at the time of its introduction, and for nearly three-quarters of a century afterwards, it was doomed to a speedy destruction at the hands of Lavoisier, a man who effected a complete revolution in C., and laid the foundation for our present ideas.

Lavoisier proved that when a metal is calcined, the calx, or residue of combustion, weighs more than the metal originally taken; and that when this calx is heated with charcoal, at the same time that the metal is regenerated, a certain quantity of gas is produced, which possesses all the properties of 'fixed air,' or carbonic acid, discovered by Black; and is, in fact, the same substance. Moreover, he showed that during calcination in a closed vessel a certain quantity of air disappears, and that the weight of the air thus disappearing is exactly equal to the increase in the weight of the metal after calcination. He thus proved that a body in burning, far from losing anything, gains in weight, and that this gain in weight is attributable to the absorption of something from the air. Lavoisier made these observations before the discovery of oxygen, but the existence of that body furnished him with the means whereby to explain his experiments, and to overturn and completely dissipate the whole doctrine of phlogiston. He eventually proved that when combustible substances are burned, they combine with oxygen contained in the air, and yield new substances. When metals are reduced from their calces by heating the latter with charcoal, the oxygen contained in the calx combines with the charcoal to form carbonic acid gas, and thus leaves the metal at liberty. The reduction of a calx by hydrogen is owing to a similar cause, but in that case water, and not carbonic acid, results. The C. of Lavoisier's day was the C. of oxygen. Substances were examined for its presence, and new bodies were obtained by combining it with various known elements or compounds. Lavoisier determined the exact composition of the air, showed that oxygen was the active ingredient, and explained the part it took in the process of Respiration (q. v.). In the course of his researches he had proved that carbonic acid was a compound of carbon and oxygen, sulphuric acid of sulphur and oxygen, phosphoric acid of phosphorus and oxygen, and nitric acid of nitrogen and oxygen. These discoveries induced him to believe that oxygen was a necessary constituent of all acids, and on this account he gave it its present name, from the Greek words ὀξύς, *sour*; γεννάω, *I produce*. That oxygen is not a necessary constituent of acids has since been proved by the discovery of the hydracids, nevertheless it is present in by far the greater number of acids. It is impossible to over-estimate the value of the reforms introduced into C. by Lavoisier. The science received an impetus never before experienced in its history, and discoveries and speculations multi-

plied in all directions. Quantitative analysis became an essential part of C., and numerous investigators laboured in its cause. Amongst the most celebrated of these may be mentioned Klaproth, Vauquelin, Stromeyer, and Berzelius. The researches of these chemists not only added to the knowledge of the composition and properties of known substances, but brought to light several new and interesting elements,—as, for instance, uranium, zirconium, titanium, tellurium, chromium, cadmium, selenium, &c.

At the time these discoveries were taking place, a most important controversy was being carried on by two French chemists, Proust and Berthollet. The latter maintained that the elements combined together in variable proportions, the former that the proportions were fixed and definite. The dispute ended in Berthollet's defeat, and in the establishment of one of the most important laws in chemistry, viz., that of definite proportions. This has brought us to the commencement of the 19th c.—a memorable period for chemists, for it was at this time that Dalton introduced the Atomic Theory (q. v.). Space does not permit us to trace the development of this theory, nor to show how the quantitative experiments of Bergman, Wenzel, Richter, Lavoisier, and others were instrumental in establishing the principles upon which it depends. The atomic theory being once firmly established upon a thorough basis of experimental evidence, chemists next turned their attention to the determination of the atomic weights of the elements, and for the results we are indebted to Dalton, Gay-Lussac, Dulong and Petit, Berzelius, Gerhardt, Staas, and others. At the time that Dalton was carrying on his experiments and enunciating his ideas, another eminent British chemist was startling the world by his striking and brilliant discoveries, and opening up a new field of research and speculation. In the year 1800, Volta had published a description of the Pile (q. v.), and shortly afterwards Nicholson and Carlisle had shown that by its agency water could be decomposed into its constituents, oxygen and hydrogen. Berzelius and Hisinger, following up the idea, had performed a series of experiments on the action of a current of electricity on various salts. It was Sir Humphrey Davy, however, who enunciated the laws of voltaic chemistry, and threw an entirely new light on the composition of an important class of bodies. He found that potash, soda, lime, baryta, strontia, magnesia, and lithia were compounds of oxygen with metals. The latter he succeeded in isolating, and demonstrated their chief properties. These discoveries eventually enabled chemists to prove that the groups of compounds called *Alkalies*, *Alkaline earths*, and *Earths proper*, are simply the oxides of metals. Into Davy's electro-chemical theory space prevents us from entering; suffice it to say, that it has done excellent service for science, although not retained at present in its entirety. Mention must here be made of the beautiful experiments of Faraday on the quantitative effects of the galvanic current in decomposing salts. (See ELECTROLYSIS.) Davy also established the fact that hydrochloric acid is a compound of chlorine and hydrogen, and that chlorine is an elementary substance, and not, as had been before believed, a compound of hydrochloric acid (or, as it was then called, *muriatic acid*) with oxygen. These facts quite upset Lavoisier's doctrines respecting the nature of acids, and led eventually to the discovery of the other hydracids, viz., hydriodic, hydrobromic, and hydrocyanic acids, and to the placing of hydrofluoric acid in the same group. Berzelius was another chemist to whom science lies under the greatest obligations. His whole life was devoted to investigation, and his labours have gone far to place C. on its present footing. To him we are indebted for much of the nomenclature of chemical substances at present in use; for his representation of atoms by symbols, and of reactions (or chemical changes) by means of equations. By his analyses he contributed largely to a knowledge of the atomic weights of the elements, and by his electro-chemical theory to a correct understanding of many important facts. His experiments with the blowpipe raised that instrument to an important place amongst chemical apparatus. He first isolated the elements silicon and selenium, showed that sulphur united with certain metals to form substances having a basic character, and with certain non-metals yielding bodies possessed of acid characters, and that these sulpho-bases and sulpho-acids combined, forming sulpho-salts. In fact, he clearly demonstrated the important analogies existing between the two elements sulphur and oxygen. His great merit lies in his having systematised C.

It was at the commencement of the present century that chemists began to direct their attention to the organic world, and to attempt to manufacture in the laboratory substances which previously had only been obtained from the products of animal and vegetable life. The first synthesis of an organic substance was that of urea, a crystalline nitrogenous compound contained in considerable quantity in the urine of the carnivora. In the year 1828 Wöhler showed that this substance was produced by a molecular change in cyanate of ammonium when its aqueous solution was boiled. This discovery opened up a grand field of research and speculation. No longer were chemists held in check by the belief that organic substances were built up by the vital force—a special agency beyond their control. What Wöhler had accomplished in the case of urea, they hoped to do with other bodies, and their experiments were soon crowned with success in all directions. Numerous new and interesting groups of carbon compounds were discovered, and organic C. became the C. of the compounds of carbon (on account of the presence of that element in all organic products). From that time to the present day organic C. has largely occupied the attention of chemists, and has led to the discovery of facts of the greatest practical importance. Of the services of this department of chemical science to the arts and manufactures too much could not be said. The brilliant discoveries of Perkin and Hoffman with aniline have supplied the dyer with the most beautiful colours ever produced, whilst not only aniline, but a host of other products, obtainable from Coal Tar (q. v.), are employed in numerous manufactures. Organic C. has supplied the physician and surgeon with medicines and remedies of the greatest value, with chloroform and chloral, carbolic acid, &c.

Among the chemists who have made organic C. their great study, none deserves more credit than Liebig, who first supplied a method for determining carbon and hydrogen in an organic body. In conjunction with Wohler he discovered the compound carbon radicals, and added to our knowledge by isolating many new and important compounds. His experiments, too, into the physiological C. of plants and animals, have been of inestimable value to the farmer, and indeed have been the means of revolutionising agriculture, and of establishing it on a rational and scientific basis.

Before quitting the history of C., mention must be made of the services done for the science by the *Spectroscope* (q. v.). Fraunhofer was the first to observe in the sun's spectrum a number of black lines, which have since been found to be owing to the presence of certain metals in the state of vapour. This observation in the hands of Bunsen and Kirchoff led to the construction of the *spectroscope*, an instrument by means of which the smallest trace of many elements can be detected. By its aid, too, several new elements have been discovered—viz., cœsium, rubidium, thallium, and gallium. Not only has the spectroscope revealed the nature of the matter of which our earth is composed, but it has also demonstrated that the masses of the sun and of many planets are composed (in part at least) of the same elements.

In reviewing the position of C. at the present time, we cannot but be struck by the marvellous rapidity of its development during the present century, with the important place it holds among the sciences, and with the vast influence it exercises on almost every department of human industry.

Principles.—From the preceding sketch, it will have been seen that the object of C. is the investigation of matter with a view to the determination of its composition and properties. But to define C. in exact language is a matter of great difficulty, owing to the fact that the sister science of physics is engaged with almost the same problems: and indeed it is urged that C. is simply a branch of physical science. We must leave the reader to form his own definition from a statement of the leading facts and doctrines of the science.

Composition of Matter.—All investigations into the nature of matter have led to the conclusion that whereas certain substances can be decomposed or split into new bodies, others resist all efforts to decompose them. Substances of the first kind are called compounds, those of the second, elements. Up to the present time science has revealed the existence of sixty-four elementary bodies (if we include the new metal gallium, discovered quite recently). These elements differ from one another in appearance and properties. They are divided into two classes, which are called respectively *metals* and *non-metals*. Of the former, with the exception of quicksilver or mercury, all are

solid at ordinary temperatures. Of the latter, four are gaseous (oxygen, hydrogen, chlorine, and nitrogen), one liquid (bromine), and the remainder solid at ordinary temperatures. Compounds are formed of the elements, united in various proportions; but the same compound always contains the same elements, and the same proportions of these. The majority of compounds contain but two, three, or four elements, but sometimes the number is greater.

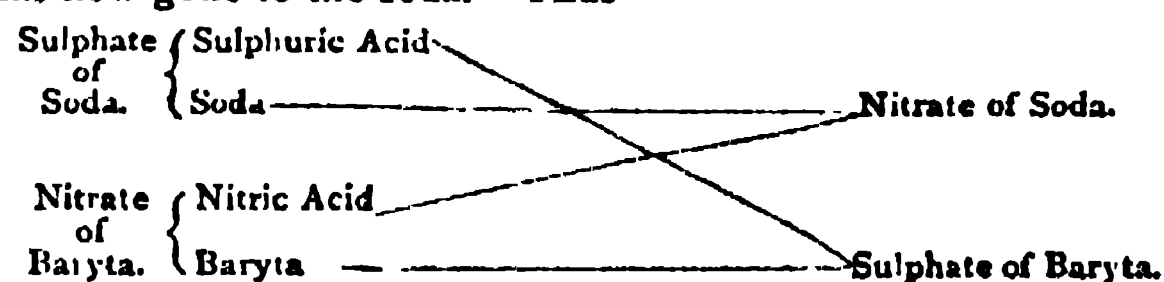
Differences between Compounds and Mixtures.—A problem of repeated occurrence to the chemist is to decide whether he is dealing with a mixture of substances, or with a true chemical compound. This is not always an easy matter, but there are certain well-marked distinctions between the two, with which the reader should be made acquainted. Compounds, as we have said, are characterised by a definite composition: if solid, they very often crystallise, and the crystals have a definite and characteristic shape; if liquid, and volatile without decomposition, they boil at a definite temperature. Moreover, and most important of all, if we produce a compound from its elements, the union of the latter is attended with a disengagement of heat. A mixture, on the other hand, may contain substances in varying quantities. In a mixture, each of the ingredients retains its own properties, and the properties of the mixture are simply the mean of these. In making a mixture, no rise of temperature occurs; and finally, it is often possible, by purely mechanical means, to separate the ingredients of a mixture, and to obtain each in an isolated condition. (For an illustration of these arguments see article ATMOSPHERE.)

The investigation of compound substances constitutes by far the most important part of C., for it is with compounds that the chemist has chiefly to deal. There are two methods by which an insight can be gained into the composition and constitution of these bodies. The one consists in separating them into their elements or into compounds of a simpler nature than themselves: the other in building them up, it may be directly, it may be by several stages, from their elements, or from compounds the nature of which is already known. The first is the analytical, the second the synthetical method.

Analysis.—In certain cases it is easy to demonstrate the composition of bodies not only qualitatively but also quantitatively; but more frequently the task is one of considerable difficulty, and demands all the skill and patience of the chemist. No better example of analysis can be chosen than that of water—one of the most abundant and well-known of all chemical compounds. If we take water and acidulate it with a few drops of sulphuric acid (to make it conduct), and then plunge into it two platinum plates connected respectively with the positive and negative poles of a galvanic battery, we observe at once a disengagement of gas from both of the plates. If we collect the gases in separate vessels, we find that they possess very different properties, the one collected from the platinum plate attached to the negative pole being combustible, whilst the other is not inflammable, but capable of supporting combustion with great brilliancy. The two gases are, in fact, hydrogen and oxygen—the two constituents of water. Another important point in this experiment is, that the volume of the hydrogen is exactly double that of the oxygen. But if the gases be weighed, as well as measured, it is found that for every one part of hydrogen, eight parts of oxygen are disengaged. The experiment proves then that water is a compound substance, containing oxygen and hydrogen in the properties of two *volumes* of the latter to one of the former, but of one part by *weight* of the latter to eight parts by weight of the former.

Many other compounds can be decomposed into their elements by the electric current, and, indeed, it is one of the most valuable decomposing agencies which the chemist possesses. We have already mentioned the fact that by its aid Sir Humphrey Davy was enabled to demonstrate the true nature of an important series of bodies.

Heat, like electricity, is a decomposing agent, and one of almost as much importance to the chemist. Its action is, however, frequently of a more complex nature; nevertheless, there are many simple analyses which may be accomplished by its aid. Thus, if red oxide of mercury be heated, it is resolved into its elements, mercury and oxygen; but in the case of many substances only partial decomposition ensues. For instance, chalk, which is a compound of carbon, oxygen, and the metal calcium, when strongly heated, splits up into two new substances—lime and carbonic acid, each of which is itself a compound. The carbonic acid contains the whole of the carbon and part of the oxygen: the lime, the whole of the calcium and the remainder of the oxygen. The action of heat on many organic substances is totally to destroy them and to produce other and often highly complex compounds. (See DISTILLATION, DESTRUCTIVE.) We see, then, that there are two very powerful physical decomposing agents, both of which, at various times, have done good service for C. But we have not spoken of decompositions brought about by chemical agents, although, from a chemist's point of view, these are the most important. All chemical decompositions are brought about by the operation of affinity, or the force which causes bodies to combine. This statement may appear contradictory, for how, it will be asked, can a force which causes union also cause disunion? The answer is, that the affinity existing between various substances differs in degree. For instance, the affinity of a body, A, for another, B, may be greater than that of A for a third, C. If, then, we have the compound A C, and place B in contact with it, A will leave C at liberty, and will go to B to form a new compound, A B. Thus, if we take gaseous hydriodic acid (a compound of hydrogen and iodine), and heat some sodium in contact with it, the iodine will unite with the sodium, forming iodide of sodium, and hydrogen will be set at liberty. We can isolate the iodine, now combined with the sodium, by passing a stream of chlorine through the aqueous solution of the iodide of sodium, for, owing to the greater affinity of chlorine for sodium, the iodine is set at liberty, and chloride of sodium, or common salt, formed. *Double decomposition* results when certain compounds are brought together under suitable conditions. For instance, if a solution of nitrate of baryta (a compound of nitric acid and baryta) is mixed with one of sulphate of soda (a compound of sulphuric acid and soda), a dense white precipitate is produced, which eventually settles down, leaving a clear solution. The precipitate consists of sulphate of baryta (a compound of sulphuric acid and baryta), whilst the solution contains nitrate of soda (a compound of nitric acid and soda). Here, then, a mutual exchange of constituents has taken place. The sulphuric acid, before combined with the soda, has left it to combine with the baryta, whereas the nitric acid, before combined with the baryta, has now gone to the soda. Thus—



Double decompositions are of frequent occurrence, and are perhaps the most important of chemical reactions.

Synthesis is the reverse of analysis, for whereas by analysis a substance is *split up* into its constituents, by synthesis it is *built up* from these. Synthesis, like analysis, serves to determine the composition of bodies, and many complex problems in this direction have been solved by its aid alone. It was by synthesis that Cavendish discovered the composition of water. In like manner, Wohler by its aid demonstrated the composition of urea, and showed for the first time that a substance of organic origin could be formed by artificial means. The synthesis of water is readily effected by mixing the two gases, oxygen and hydrogen, in the proper proportions, and kindling the mixture, either by the electric spark or by the application of a flame. If the experiment be made in a closed vessel of sufficient thickness, a flash of light is observed, and the sides of the vessel become covered with dew. But if the experiment be made in an open vessel, a very loud explosion takes place. Water is a product of nearly all ordinary combustions, for most combustible substances contain hydrogen, and the air supplies the oxygen. Thus it can be seen that in the combustion of a candle, of wood, gas, or coal, water is produced. In order to effect the synthesis of a body, it is frequently necessary to proceed in an indirect manner, for in the majority of cases, the elements of which a substance is composed do not unite directly to form the substance.

Affinity.—We have already spoken of affinity as being the force which causes chemical union, and have stated that it differs in degree, being in certain cases very intense, in others very weak. At the present time chemists and physicists are undecided in their opinions as to the nature of this force, but that it is inti-

mately connected with heat and electricity cannot be doubted. Faraday, indeed, stated that 'the forces called electricity and chemical affinity are one and the same.' The degree of affinity existing between two bodies is measured by the amount of heat given out during their combination. A rough estimate of the affinity can also be formed by observing the stability of the compound when formed: unstable bodies—or such as are readily decomposed—containing elements with a weak affinity for one another. Thus the affinity of hydrogen for iodine is so slight that their compound, hydriodic acid, decomposes spontaneously when exposed to the light. Chemical attraction or affinity is a force of enormous power, but is only exercised at minute and inappreciable distances. Thus a piece of iron is completely dissolved when acted upon by hydrochloric acid; the affinity of chlorine for iron being so great that the particles of the latter are torn from one another, the cohesion which formerly kept them together being completely overcome. But actual contact of the iron and hydrochloric acid is necessary, no action whatever ensuing if the acid be simply approached to the iron. Affinity differs, then, from gravity in its mode of action. The difference in the amount of affinity existing between different bodies is well illustrated by the replacement of metals from their solutions. If some mercury be placed in a solution of nitrate of silver (a compound of the radical of nitric acid and silver), the whole of the silver is gradually deposited in beautiful crystals, and the solution eventually contains nothing but nitrate of mercury. If copper be placed in the solution of nitrate of mercury, the mercury in its turn is deposited, and nitrate of copper is formed; and in a similar manner the copper may be replaced by lead, and the lead by zinc. These replacements are entirely due to the difference in the affinity of the nitric acid radical for the various metals, the affinity being strongest in the case of zinc, and weakest in the case of silver.

Laws of Chemical Combination.—These laws are of the greatest theoretical and practical importance, and deserve our special attention. The first law is that of *definite proportions*, and may be thus stated:—*Two substances in combining, do so in definite proportions. The same compound, no matter what its source or origin may be, always contains the same constituents, and the same proportions of them.* Thus water, obtained from the clouds, from the sea, from a spring, or from a burning candle, invariably contains 88·89 per cent. of oxygen, and 11·11 per cent. of hydrogen. The second law is that of *multiple proportions*, and is as follows:—*If two substances combine in more than one proportion, then, taking in the compounds so formed the same quantity of one of the substances, the quantities of the other vary in a simple manner.* Thus nitrogen forms five compounds with oxygen, in which, taking the proportion of nitrogen as constant, and as being 28 parts by weight, the quantities of oxygen are respectively 16, 32, 48, 64, and 80. In other words, the proportion of oxygen increases in the ratio of 1, 2, 3, 4, and 5. The facts relating to the replacement of substances by one another, and their *equivalence*, are also of great importance, and belong to this branch of the subject. We have pointed out how the difference in the affinity of substances was proved by the replacement of metals by one another in their solution. Now, if we determine the quantities of the different metals replacing one another, we find that for every 108 parts of silver deposited, 100 parts of mercury are dissolved; that 31·7 parts of copper precipitate 100 parts of mercury; that 103·5 parts of lead precipitate 31·7 of copper; and finally, that 32·7 parts of zinc precipitate 103·5 parts of lead. These quantities of the different metals are said to be equivalent to one another, because they combine with the same quantity of the nitric acid radical, and thus play the same part. Not only do they combine with the same quantity of the nitric acid radical, but also with the same quantities of chlorine, oxygen, sulphur, &c. Again, in the case of acids and bases, we find that different quantities of the latter are required to saturate (or completely neutralise) the same quantities of the latter. Thus, in order to saturate 49 parts of sulphuric acid, 56 parts of caustic potash, 40 of caustic soda, 17 of gaseous ammonia, and 37 of slaked lime are required, and the same quantities of these bases saturate 63 parts of nitric acid and 36·5 of hydrochloric acid. The numbers expressing these quantities of acids and bases are said to be their *equivalents*.

Atomic Theory.—The laws of combination and the facts of equivalence are beautifully explained by means of the Atomic Theory (q. v.), which asserts that all matter is composed of ultimate particles or atoms, which by no means in our power can be further subdivided. The atoms of which an element is composed are of the same kind, and possess the same weight and properties; but the atoms of different elements differ from one another in these respects. As up to the present time sixty-four elements have been discovered, it follows that we are acquainted with but sixty-four kinds of atoms. The atoms of each element are characterised by their weight (atomic weight), by their attraction for other atoms (affinity), and by the proportion in which other atoms combine with them (atomicity). With regard to the size and shape of the atoms nothing is known, neither are we acquainted with their *absolute* weight; but it has been found possible to determine their relative weights, *i.e.*, their weights as compared with one another. For this purpose the atom of hydrogen is chosen as representing unity, and the atomic weight of an element is defined as the weight of its atom (or smallest particle capable of existence), compared with the weight of the atom of hydrogen. For information respecting the methods by which the atomic weights have been determined, the reader is referred to article ATOMIC THEORY. A curious point in connection with the atoms is, that in the majority of cases a single atom cannot exist in the free state, but immediately combines with others of its own kind. Thus a single atom of hydrogen is only known in combination: as soon as it becomes free it seizes upon a neighbour, and forms a group of two atoms. To designate this group—or indeed the smallest particle of any body, whether simple or compound, capable of existing in the free state—the term *molecule* is employed. The molecule of hydrogen therefore contains two atoms. Compounds are formed by the juxtaposition or union of the atoms of elements in various proportions; but the molecule of the same compound always contains the same number and kind of atoms, arranged in the same manner. A drop of water, for instance, is composed of myriads of particles or molecules, each of which contain one atom of the element oxygen and two atoms of the element hydrogen. The explanation of the law of definite proportions is at once clear after this statement. Let us take the example of water to illustrate this. A molecule of water contains one atom of oxygen with the atomic weight 16, and two atoms of hydrogen with an atomic weight of 1. The proportions of oxygen and hydrogen present in water are therefore—

$$16 . 2 \text{ or } 88 \cdot 89 : 11 \cdot 11,$$

and these proportions cannot vary. The law of multiple proportions also admits of a ready explanation; for as the difference between the various compounds which two elements form depends upon the number of atoms present in the molecules of each, it follows that the proportions of the two elements will vary directly as these numbers. Thus the oxides of nitrogen contain in their molecule respectively 1, 2, 3, 4, and 5 atoms of oxygen, combined with 2 atoms of nitrogen, each of which has an atomic weight of 14. As the atom of oxygen weighs 16, the first compound will contain 28 parts of nitrogen and 16 of oxygen, the second 28 parts of nitrogen and 32 of oxygen, and so on. The facts of equivalence are also explained by the atomic theory. Let us take the case of the replacement of metals. We saw that 108 parts of silver were replaced by 100 of mercury, the mercury by 31·7 of copper, the copper by 103·5 of lead, and the lead by 32·5 of zinc. Now it will be found on an inspection of the table of atomic weights (see ATOMIC THEORY) that, with the exception of 108, these numbers represent *half* the atomic weights of the different metals, and that 108 is the atomic weight of silver. As atoms cannot be halved, it is clear that 2 atoms of silver are replaced by 1 atom of mercury, the mercury by 1 atom of copper, the copper by 1 atom of lead, and the lead by 1 atom of zinc.

Molecular Weights.—By the molecular weight of a body, simple or compound, is understood the weight of its smallest particle capable of existence in the free state, compared with the weight of the atom of hydrogen. The determination of the molecular weights of compound substances is of great importance, because by simple analysis we cannot determine the actual number of the different atoms present, but only their ratio. Thus the analysis of benzol shows that it contains in every 13 parts, 12 parts of carbon and 1 part of hydrogen; and as the atomic weight of carbon is 12, we should be inclined to admit that benzol is a compound of 1 atom of carbon and 1 atom of hydrogen, and therefore that its molecular weight was 13. But a direct determination of the molecular weight of benzol shows it to be 78, *i.e.*, exactly six times 13. From this we conclude that the molecule of benzol contains 6 atoms of carbon combined with 6

atoms of hydrogen. The direct determination of molecular weights can only be accomplished in the case of volatile bodies. In other cases these weights can only be deduced either from the steps taken in the synthesis of the bodies, from a consideration of their reactions, or from the different products yielded by their decomposition.

Avogadro and Ampère enunciated the law that *in equal volumes of all gases and vapours, under the same conditions of temperature and pressure, the same number of molecules is contained.* Thus, in a litre of hydrogen and benzol vapour, at a temperature, let us say, of 100° C., and a pressure of 760 mm., the same number of molecules is contained. Now the specific gravity of a gas or vapour is defined as the weight of a given volume, compared with the weight of the same volume of hydrogen under the same conditions of temperature and pressure.

$$\text{Sp. gr.} = \frac{\text{Weight of a given volume of gas or vapour at T. and P.}}{\text{Weight of same volume of hydrogen at T. and P.}}$$

But what does the weight of a given volume of the gas or vapour depend upon? First, upon the weight of each molecule; next, upon the number of molecules present. Let M represent the former, and x the latter. Then the weight of a given volume of gas or vapour at T and P = M × x. In the same manner the weight of the equal volume of hydrogen depends upon the weight of its molecules, and upon their number. By Avogadro's law the latter is x, and we have seen that the former is 2 (the molecule of hydrogen containing 2 atoms).

We have then:—Weight of equal volume of hydrogen at T and P = 2 × x, and therefore—

$$\text{Sp. gr.} = \frac{M \times x}{2 \times x} = \frac{M}{2};$$

from which it follows that

$$M = 2 \times \text{sp. gr.}$$

In other words, the molecular weight of a body is determined by multiplying the specific gravity of its vapour by 2.

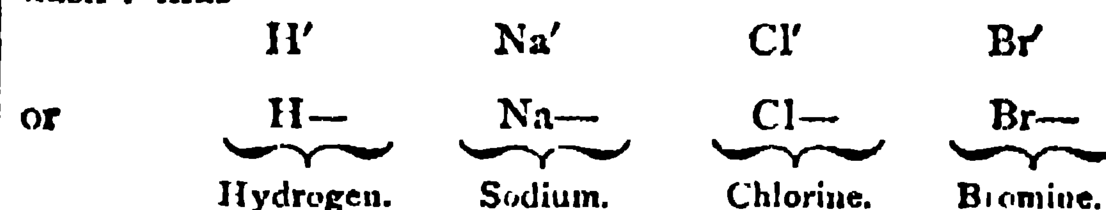
Chemical Notation.—Berzelius was the first to introduce the present system of symbols and formulæ as a means of briefly stating the composition of chemical substances. The most important points in connection with this subject are as follows:—An atom of an element is represented by means of the first letter or letters of its Latin name. Thus 'Hg' represents an atom of mercury (hydrargyrum), 'Na' an atom of sodium (natrium), 'K' an atom of potassium (kalium), &c. The composition of a molecule of an elementary substance is expressed by writing the symbol or symbols of the atoms of which it is composed side by side, and affixing small figures to the right hand, and a little below each symbol, to indicate how many atoms of the element in question are contained in the molecule. Thus P_4 represents a molecule of phosphorus, and shows that it consists of a group of 4 atoms of the element; $C_{12}H_{22}O_{11}$, a molecule of cane-sugar, containing 12 atoms of carbon, 22 of hydrogen, and 11 of oxygen. To represent several molecules a number is prefixed to the formula of the molecule, with or without a bracket. Thus $2P_4$ represents two molecules of phosphorus, $6(C_{12}H_{22}O_{11})$ six molecules of cane-sugar. A chemical equation represents by means of symbols or formulæ a chemical reaction. Thus—



$$2H_2 + O_2 = 2H_2O$$

represents the reaction which takes place when hydrogen combines with oxygen, and shows that two molecules of hydrogen (each containing two atoms) and one molecule of oxygen (also containing two atoms) give two molecules of water (each of which contains two atoms of hydrogen and one of oxygen). The sign + is equivalent to 'together with' or 'and;' the sign = to 'gives.' Such an expression is called an equation, because the quantity of matter represented on the left hand is equal to the quantity on the right. A chemical equation is *a qualitative and quantitative expression of a chemical reaction.* Qualitative, as it shows by means of symbols the composition of the different molecules, reacting and produced. Quantitative, for several reasons:—(1.) It represents the atomic composition of the different molecules. (2.) It also represents the relative *weights* of the different substances taking part in the reaction. For in the above equation $2H_2$ represents 4 atoms of hydrogen (the weight of each of which is taken as unity), and therefore 4 parts by weight; O_2, 2 atoms of oxygen (each of which weighs 16 times as much as the atom of hydrogen), and therefore 32 parts by weight; $2H_2O$, twice the combined weight of 2 atoms of hydrogen = 2 and 1 atom of oxygen = 16, and therefore 36 parts by weight. It follows that 4 parts by weight of hydrogen and 32 parts by weight of oxygen give 36 parts by weight of water; or, what is the same thing, 1 part by weight of hydrogen and 8 parts by weight of oxygen give 9 parts by weight of water. (3.) An equation also represents, in the case of gases or vapours, the relative volumes of them taking part in the reaction; for by Avogadro's law the same number of molecules is contained in equal volumes of all gases and vapours, providing they be at the same temperature and pressure, and therefore *the indices to the number of molecules are also the indices to the relative volumes.* Providing, therefore, that oxygen and hydrogen be at 100° C., and that the pressure is constant, 2 volumes of the latter and 1 volume of the former will give 2 volumes of steam.

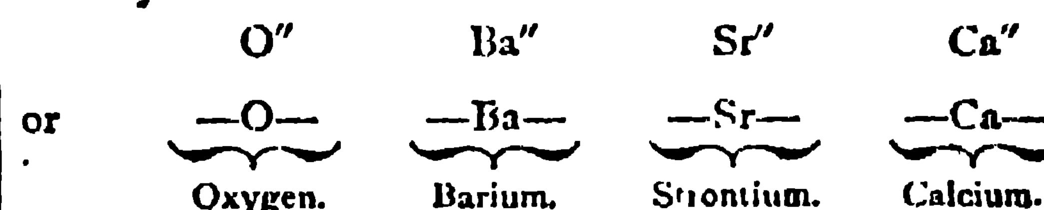
Atomicity.—We have said that the atoms are characterised by their weight, their affinity, and by the proportions in which they combine with other atoms, or their *atomicity.* The theory of atomicity, although for many reasons unsatisfactory, has nevertheless done good service for chemistry, by explaining the constitution of bodies and the existence of isomers, and by enabling the chemist to foresee the existence of new compounds. Starting with the fact that a certain number of elementary substances combine in a single proportion—that of atom to atom—it has been conjectured that the atoms of these elements each possess a certain something—a point of attraction, arm, or link—which, for want of a better name, has been called an 'atomicity.' The nature of an atomicity remains in obscurity, but it is believed to be by its means that the atoms become attached to one another. Atoms possessing but a single atomicity may be likened to men possessed of but one arm, who are therefore capable of holding by the hand a single individual. An atomicity is represented graphically by affixing to the symbol of the element a stroke or dash: thus—



and the compounds of these elements with one another thus—



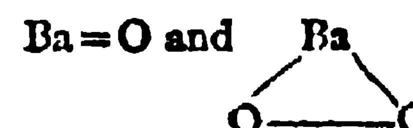
where the straight line between the two symbols is supposed to represent the coalesced atomicity of both atoms. The elements of this class are said to be *monatomic* or *monovalent,* or are simply called *monads.* The atoms of a second class of elements combine with two atoms of a monad, and are therefore supposed to possess two atomicities. These elements are called *dyads.* Oxygen, barium, strontium, and calcium belong to the group. To represent their diatomic properties two dashes are affixed to their symbols: thus—



A dyad combines at maximum with two atoms of a monad. Water and chloride of calcium are typical of such compounds—

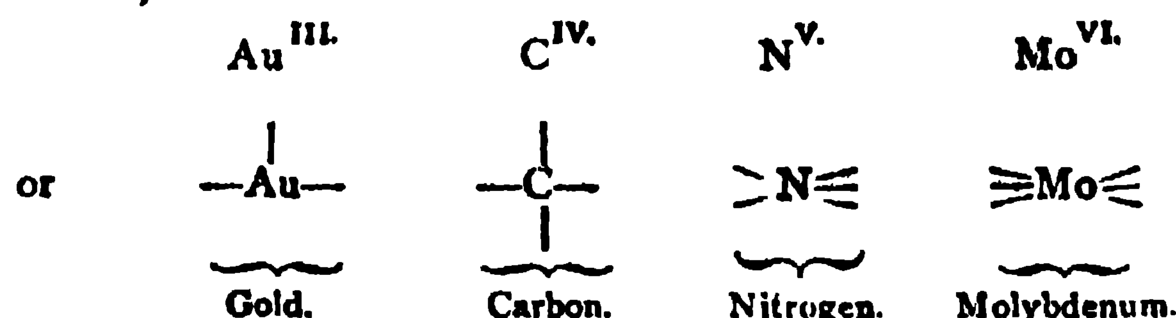


But dyads can combine together in more than one proportion. Thus barium forms two oxides, BaO and BaO_2, the constitution of which is supposed to be



There are other elements which from their properties are believed to possess three atomicities, others four, five, and six; but no element exists having a higher atomicity. These different classes of elements are called respectively *triads, tetrads, pentads,*

and *hexads*, and their atomistic properties are represented by affixing to their symbols the corresponding figure or number of dashes, thus :—

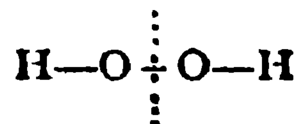


The atomicity of an element can only be determined from its compounds with monads, or with monatomic groups.

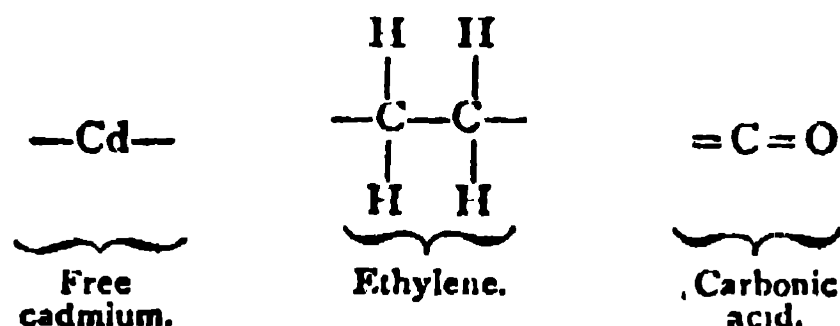
An important point in the theory of atomicity is that, with one or two exceptions, no molecules exist containing an atom having a single atomicity unoccupied. Such a group (which is said to be *unevenly unsaturated*), on being set at liberty, at once combines with a neighbour of its own kind, and forms a double group. It is supposed to be for this reason that the molecules of hydrogen, chlorine, and bromine each contain two atoms—



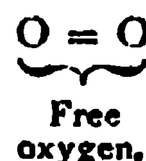
Again, the group hydroxyl —O—H, although existing in caustic potash, K—(O—H), and water, H—(O—H), becomes doubled when set at liberty, forming peroxide of hydrogen—



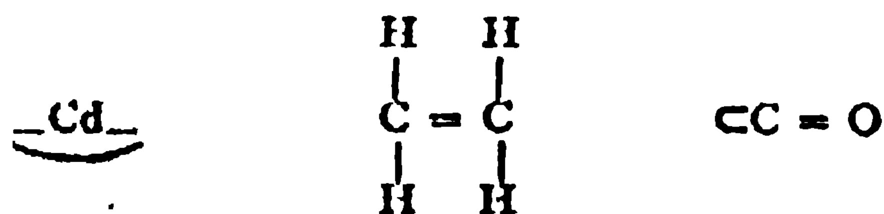
and many other instances can be quoted. *Evenly unsaturated* molecules do exist; for instance, cadmium, ethylene, carbonic oxide.



But others become doubled; thus oxygen—



Here we see the atomicities of two atoms of the same element coalescing. It has been thought possible that in the case of evenly unsaturated bodies, the two atomicities also coalesce. The molecule of cadmium, ethylene, and carbonic oxide are represented on this view thus—



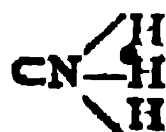
Many elements of an atomicity greater than two have a varying atomicity; thus nitrogen, which is pentatomic in some compounds—chloride of ammonium, for instance (NH_4 Cl)—



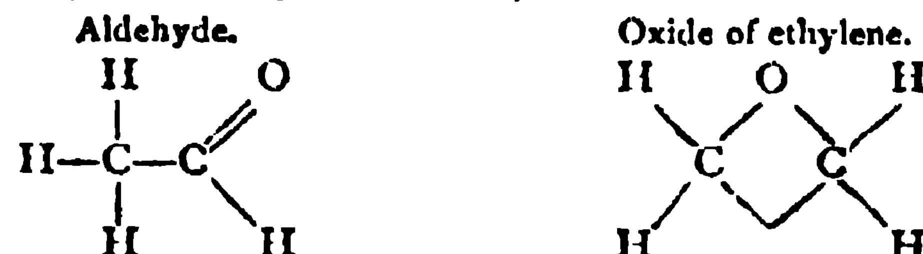
is triad in most of its compounds; for instance, ammonia—



The other arms becoming occluded or inactive. As the atomicity of such bodies always varies by *two*, it has been supposed that the two atomicities coalesce, as in the formula just given for carbonic oxide. Thus,



Constitution.—We have said that the nature of a compound depends upon the number and kind of atoms composing it, and also upon the manner in which the atoms are *arranged* or grouped. The last is an important point, for we very frequently find (more especially in the case of the compounds of carbon) that the molecules of two or more bodies contain the same number and kind of atoms, and yet possess very different properties. Thus acetic aldehyde and oxide of ethylene both have the formula C_2H_4O. The difference between such bodies can only be explained by assuming that the atoms composing their molecules are differently grouped; in other words, that they have a different *constitution*. The investigation of the constitution of compounds forms one of the principal aims of modern C., and has already advanced considerably. Substances which, like aldehyde and oxide of ethylene, have a similar atomic composition but a different constitution, are said to be *isomeric* (see ISOMERISM). Substances the molecular weights of which are multiples of one another, are said to be *polymeric*. Thus acetylene, C_2H_2, and benzol, C_6H_6, are polymers. The theory of atomicity has lead to the introduction of *graphic formulæ* for representing the arrangement of the atoms in a molecule. Subjoined are the graphic formulæ of the two isomeric substances we have mentioned to illustrate the manner in which the difference in their constitution is accounted for by the theory of atomicity.



Chemists and Druggists, Laws Relating to. The Pharmaceutical Society of Great Britain was incorporated by royal charter on 18th February 1843. The charter provides that the society shall have the right to examine candidates for admission, and to confer on those qualified the title of 'Pharmaceutical Chemist.' To assume the title without licence is punishable by fine; but the practice of a chemist and druggist is open to all. The Council of the Society is required to appoint examiners for Scotland, who have the same powers as the examiners in England. No member of the medical profession, or who is practising under the right of a degree of any university, or diploma or licence of a medical body, is entitled to be registered; and if any one who is registered become a member of the medical profession, he is disqualified from remaining on the register. See APOTHECARY.

Chem'nitz, the first manufacturing and second trading town of Saxony, on a river of the same name, in a wide valley, at the foot of the Erzgebirge, 36 miles S.W. of Dresden by railway. It has 80 cotton and spinning mills, 450 machines and 3000 handlooms, 50 machine-works, supplying locomotive and other engines to all parts of Europe, over 50 large dye-works, besides manufactures of silk, gloves, lace, musical instruments, embroideries, &c. In 1874 the export of woollen, cotton, and other manufactured goods to America alone amounted to £420,776. There are various technical schools, several good public buildings, an exchange, a large theatre, and fine promenades formed on the site of the old walls. Pop. (1871) 68,229. The first Christian church was built here in 938 by Otto I., and C. became an imperial city under Rudolf of Hapsburg in the 13th c. It was ruined by the Thirty Years' War, and only began to prosper again on the introduction of cotton-weaving in the end of the 17th c.

Chem'nitz, Martin, one of the most distinguished theologians of the Lutheran Church in the 16th c., was born at Treuenbrietzen, in Brandenburg, 9th November 1522, and studied under Melancthon at Wittenberg. In 1547 he was appointed rector of the cathedral school at Königsberg, where he engaged in a controversy with Osiander in defence of the Lutheran doctrine of justification. Returning to Wittenberg in 1553, he lectured on Melancthon's *Loci Communes*—the origin of his own *Loci Theologici*, reckoned the best book of systematic theology produced in that age. In 1554 he settled in Brunswick, where he first became pastor, then superintendent, and died 8th April 1586. He is most distinguished for his treatises against the Jesuits (*Theologiæ Jesuitarum præcipua capita*, Leips. 1562) and the Decrees of the Council of Trent (*Examen Concilii Tridentini*,

4 vols. Leips. 1565); but probably the greatest ecclesiastico-political work of his life was inducing the Churches of Saxony, Franconia, and Swabia, to adopt the *Concordienformel* as their confession of faith.—**Martin C.**, son of the preceding (born 1561, died 1627), became privy councillor and chancellor to the Duke of Holstein-Gottorp.—**Philipp Bogislav von C.**, son of the younger Martin (born 1605, died 1678), entered the service of Sweden, was made royal historiographer, and raised to the order of nobility.

Chemnit'zia, a genus of Gasteropodous mollusca, the shell of which is of slender, elongated shape—the aperture being oval and the operculum horny. This genus is included in the family *Pyramidellidæ*, and its fossil representatives first appear in the Permian rocks, more than 150 fossil species being known.

Chenab', the largest of the rivers from which the Punjab ('five rivers') takes its name. Its source is in the Paralasa range of the Himalayas. After a course of about 600 miles it receives the Jhelum on its right; somewhat lower down, the Ravee on its left; and 110 miles still lower, on the same side, the united stream of the Beas and Sutlej. The entire body of waters before joining the Indus bears the name of the Punjnud. At Waizerabad the railway crosses C. by one of the longest iron bridges in the world, having a length of 1¼ miles, and consisting of 64 spans of 1426 feet each. This bridge was opened by the Prince of Wales, 22d January 1876.

Chén'ier, André-Marie de, a French poet and political writer, was born October 29, 1763, at Constantinople, where his father was consul-general for France. He came to France at an early age, and studied at the Collége de Navarre, in Paris, there evincing poetic talent and acquiring a passion for ancient literature. In 1784 he travelled on account of his health in Switzerland, Italy, and Greece, and in 1787 he visited England as secretary to the embassy of M. Luzerne. Returning to Paris in 1790, while the Revolution was raging, he joined the brilliant 'Society of '89,' and volunteered to assist the infirm Malesherbes in the defence of Louis XVI. C. stood as far apart from despotism as from anarchy, and in prose and verse proclaimed at once his love of liberty and his detestation of violence. He was at last brought before the Revolutionary Tribunal, was condemned, along with forty-five others, and was guillotined, July 25, 1794. When in prison C. burst forth in a beautiful ode. *La Jeune Captive*, of which the subject was his fellow-prisoner, the celebrated Comtesse de Coigny. His *Elégies* are exquisite in their mingling of classical spirit with an original boldness and vivacity. Only a tithe of his projected poems were finished, still the influence of C. is clearly visible in the early works of Chateaubriand, Barthelémy, Lamartine, and Victor Hugo. Of the many editions of his *Poésies*, the best are those of Delatouche (Par. 1840), and Becq de Fougières (1862); and of his *Œuvres en Prose*, there is a selection by Hugo (1840).—**Marie-Joseph de C.**, brother of the former, was born at Constantinople, August 28, 1764, and became famous as the principal dramatist of the Revolution, and as a member of the Legislative Assembly from 1792 to 1802. He is also the author of the *Chant du Départ* and other songs. His dramas, of which the chief are *Charles IX.* (1790), *Jean Calas* (1792), *Henri VIII.* (1793), and *Timoléon* (1795), are full of republican declamation, and of the wild sentiments of the time. C. died January 10, 1811. His *Œuvres Complètes* were published in 8 vols., with a memoir by Daunou (1823–26).

Chenopodia'ceæ, the Goosefoot or Spinach order, a natural order of Dicotyledonous plants, herbs, or small shrubs very generally distributed over the world, but chiefly found in temperate or ex-tropical countries. There are about 500 species, and among the best-known of the seventy-four genera are *Salicornia, Atriplex, Beta, Chenopodium*, and *Salsola*. From the ashes of several species—*Salsola, Salicornia*, &c.—which grow in salt marshes, *barilla*, used for obtaining carbonate of soda in former times, is obtained; but on account of soda being now much more easily obtained from other sources, the demand has of late fallen off. Among the other species are beet and mangold-wurzel (see BETA), spinach, &c. The seeds of several of them contain volatile oil or are nutritive—*e.g.*, Quinoa (q. v.). Some are anthelmintic, antispasmodic, aromatic, carminative, and stimulant. The fruit of the strawberry Blite (*Blitum capitatum* and *B. virgatum*) of the S. of Europe has a sweetish, insipid taste.

Chenopod'ium, a genus of *Chenopodiaceæ* (q. v.), some of the British species of which are weeds, known under the name of *Goosefoot*. *C. ambrosioides*, the Mexican tea, is, owing to the essential oil which it contains, tonic and antispasmodic. *C. anthelminticum* yields 'wormwood oil,' so popular in the United States as a vermifuge. *C. Quinoa*, of the Pacific slopes of the Andes, is remarkable in so far that its seeds are extensively used as food by being ground and eaten as a gruel after the preparation has been seasoned with Chili pepper and other condiments, or by the seeds being roasted and boiled in water, which, after being seasoned, is supped. This last mixture, called *carapulque*, is a favourite Peruvian dish, and though unpalatable to those unaccustomed to it, is said to be very nutritious. The young leaves and shoots of the Good Henry, wild spinage, or Thesavy (*C. Bonus-Henricus*), a common British wayside weed, are, as well as those of *C. intermedium, C. album*, used as substitutes for spinach. The stinking goosefoot (*C. olidum*) is an antispasmodic and emmenagogue. *C. Botrys*, the 'Jerusalem oak,' of the S. of Europe, is expectorant and anthelmintic.

Chep'stow (Old Eng. *Ceapstow*, 'a place of trade'), a town of Monmouthshire, on the Wye, is a station on the S. Wales and Union Railway, 17 miles E. by N. of Newport, and has a river and coast trade in coal, iron, millstones, bark, cider, &c. It lies in a rocky gorge, where the river is crossed by a fine bridge, and is exposed to some danger from the tide, which frequently rises to the height of 50 feet, and even higher. Pop. (1871) 3347. About 5 miles off are the ruins of Tintern Abbey.

Cheque is a draft or order on a banker. It is subject to a stamp-duty of one penny, adhesive or impressed. A C. must be payable on demand to the bearer, and be drawn on a banker under fifteen miles of the place of issue. A *crossed C.* has the name of a banker written across the face of it, to whom for security it is payable, or it may be crossed simply '—— & Co.' leaving the holder to insert the name of the banker. In this case it is only paid through that banker. If presented by any other person, it is not paid without inquiry. By statute the crossing is to be held a *material part of the C.* Any one obliterating or altering a C., with intent to defraud, is guilty of felony. A banker is personally liable if he pay a C. to which the signature of the drawer is forged; but if the signature of the payee only be forged, and that of the drawer genuine, the bank or banker is not liable to the drawer. In *Smith* v. *The Union Bank of London*, it has recently been decided that a banker paying a C. to a party other than the bank whose name was written across, was entitled to do so. This decision has caused surprise and dissatisfaction in commercial circles, and will probably occasion further legislation.

Cher, one of the most central departments of France, in the basin of the Loire, has an area of 2800 sq. miles, and a pop. (1872) of 335,392. It is in great part an unbroken plain, bounded on the E. by the Loire, and intersected by the C. and Sauldre with their affluents, forming fertile valleys, in which are cultivated cereals, hemp, and vines. There are many fine forests, as those of Vierzon, Soudrain, Bornac, Chœurs, &c., and in the S.E., where rises a low range of hills, there occur extensive marshes. The climate is cold but healthy. Among the chief industries are cattle-rearing and iron-mining, while there are also extensive manufactures of cloth, porcelain, lace, glass, leather, &c., and a large export trade in agricultural produce, iron, and timber. C. is traversed by several canals, and by the Orleans and Lyons Railway. The capital is Bourges. The department was chiefly formed out of the provinces of Haute-Berri and the Bourbonnais.—The *river C.* rises in Creuse, near Crocq, flows N.W. through the department to which it gives name, and waters Loire-et-Cher and Indre-et-Loire, entering the Loire below Tours after a course of over 200 miles.

Cheras'co, a fortified town in the province of Turin, N. Italy, at the confluence of the Tanaro and Stura, 30 miles S.E. of Turin, has some wine and silk industries. The beautiful church of Madonna del Popolo, with a remarkable sanctuary, is much visited by foreigners. The town was taken by the French, April 28, 1796, and three days later the armistice of C. was concluded here, by which the troops of France were allowed free passage through the states of Sardinia. Pop. 10,000.

Cher'bourg, a strongly fortified seaport, and the most important town in the department of Manche, France, near the mouth

of the Divette, 16 miles E.S.E. of Cape la Hogue, and 214 W.N.W. of Paris, with which it is connected by railway. It is one of the first arsenals of France, and the chief station of the marines. The town has a church of the 15th c., an hospital founded by Napoleon, a valuable fine-art collection, and a library of 61,000 volumes. The extensive fortifications of C. were begun by Vauban, and were only completed in 1858, at the enormous cost of £8,000,000. To the N. the roadstead is commanded by a detached breakwater, which is nearly parallel to the shore, is 2¾ miles long, encloses an area of 2000 acres, and supports six strong batteries. Round each end of this breakwater or *digue* vessels enter the harbour, and these channels are further protected by a series of island and mainland redoubts. The two main strongholds of C. are the extensive *Roches des Flamands* and *Roches du Homet*, and the town itself is overlooked by two forts, placed on the heights of Roule. The defences of C. make up a total of thirty forts of all kinds. The military port includes an outer harbour, having an area of 18 acres, and a floating dock of 15, and an inner floating dock of 21 acres, together admitting forty vessels of the first rank. There are also extensive shipbuilding slips and graving-docks. At the mouth of the Divette is the commercial harbour, connected with the sea by a channel 2270 feet in length, and protected by a granite mole. Besides the naval industries, there are manufactures of lace, hoisery, chemicals, leather, &c., and an export trade chiefly in cattle, salt, and wine. Pop. (1872) 46,000, exclusive of the garrison and naval force. C., under the name *Carusburg*, is first authentically known in the 11th c., when a certain Comte Gerbert de C. appears in the ranks of the Normans at Hastings. In 1418 it was taken by the English, in 1450 retaken by Charles VII., and in 1758 again captured by the English, who destroyed its defences. A grand fête was given at C. on the opening of the inner floating dock by Napoleon III., at which the Queen of England and court were present by invitation, August 1858.

Cher'ibon, or Sheribon, the capital of a Dutch residency of the same name, in Java, on the N. coast of the island, has a trade in teak-wood, coffee, and indigo. Pop. of town, 12,000, of residency, 550,000.

Cherimoy'er (*Anona Cherimolia*), a delicious Peruvian and Brazilian species of custard-apple, now naturalised in the E. Indies and other tropical countries, and reckoned inferior only to the mangosteen. It belongs to the order *Anonaceæ*. See CUSTARD-APPLE.

Cherkask'. See TCHERKASK.

Cherr'y (*Cerasus*), a genus of shrubs or trees belonging to the natural order *Rosaceæ*. It might be regarded as a sub-genus of *Prunus* or Plum (q. v.). There are many species scattered all over the temperate portions of the world, *C. avium* (the gean), and *C. vulgaris*, both natives of Britain (though according to some the latter is a native of Syria and Western Asia generally, and only naturalised in Europe), and believed to be the progenitor of all the varieties of cultivated cherries. Their wood is highly valued by cabinetmakers and musical instrument makers. From the fruits of *C. avium* a spirit called *Kirschwasser* (q. v., and also *Maraschino*) is distilled in Germany, and the fruits are also extensively used in France, Germany, and Scandinavia for making soups. Among the other species are *C. Padus*, the Bird Cherry (q. v.) or hogberry, *C. Mahaleb*, of the middle and S. of Europe, *C. Virginiana* of America, *C. Capollim* of Mexico, *C. caprecida* of Natal, *C. occidentalis*, *C. Lusitanica*, and *C. Laurocerasus*, both of which have evergreen leaves, &c. The wood of most of them is valued. Some have astringent bark, also esteemed as a febrifuge, while the leaves and kernels of nearly all contain hydrocyanic (Prussic) acid. There are very many cultivated varieties of C. esteemed for their fruit and the liqueurs prepared from it. In addition to Maraschino and Kirschwasser, the Ratafia of Grenoble is prepared from pounded cherries to which brandy, spices, and sugar are added. A gum not unlike gum-arabic exudes from the bark of many species of the genus.

Cherry Laurel, Common Laurel, Bay Laurel, Laurel Cherry, or Laurel Bay, a name which should properly be limited to *P. Laurocerasus*, but which is often vaguely applied to the species of *Cerasus* which have evergreen leaves. From the amount of hydrocyanic acid contained in it, nearly every part of the shrub is poisonous. The vapour of the bruised leaves will kill small insects. Hence, though custards, &c., are sometimes flavoured with C. L. water, great care should be exercised in its use.

Cher'so, an Austrian island in the Adriatic, government of Trieste, 12 miles S.S.W. of Fiume: area 105 sq. miles; pop. 7590. The surface is rugged, and towards the N. there are forests. There is a town of the same name on the W. coast, with a pop. of 3500.

Chers'on. See KHERSON.

Chersone'sus, a Greek word denoting literally a land-island, *i.e.*, a peninsula. Pausanius applies it even to an island united to the mainland by a bridge. Several places were so named by the ancients:—the *Tauric C.* (the Crimea), the *Thracian C.* (the peninsula of Gallipoli), the *Cimbric C.* (Jutland), and the *Golden C.* (Farther India or Malacca).

Chert'sey (Old Eng. *Ceortes-ig*, 'Ceort's Island,' so called because situated on a spit of land between the Thames and a brook), a town in Surrey, 21 miles S.W. of London by railway, on the right bank of the Thames, which is here crossed by a handsome bridge. It has several almshouses, one founded by Cowley the poet, who died here, and a school founded in 1725 by Sir William Perkins for clothing and educating fifty children. The principal trade is in malt, flour, tiles, and bricks, and vegetables for the London market. C. is a very old place. Bede (*Hist. Eccl.* lib. iv. cap. 6) says that Earconwald, Bishop of the E. Saxons in London, built a monastery here (*circa* 666 A.D.), but the town plays no part in history. Pop. (1871) 3146.

Cher'ub (pl. *Cherubs*, Heb. *Cherubim*), in the theology of the Hebrews was a creature of composite form, variously described in the sacred books. It is represented as having the human form (Ezek. i. 5), hands (Gen. iii. 24), two wings and one face (Exod. xxv. 20), four wings, four faces—of a man, a lion, an ox, and an eagle—four hands, the soles of the feet like a calf's, and the whole body full of eyes (Ezek. i.). The four beasts of the Apocalypse (iv. 6–8) had six wings, and each a different form—of a lion, a calf, (the face of) a man, and an eagle. The attributes thus assigned to cherubs indicate the power of looking and moving swiftly in any direction without turning. As to the idea attached to the cherubs, everything points to this, that their proper task was to guard the unapproachable. The parallel to them is found in the winged bulls and lions of Nineveh (from which, it has been conjectured, they were borrowed, as recent discoveries show a strikingly close connection between Hebrew and Babylonian theology), the sphinx of Egypt, the chimæra, and griffin. Now the part ascribed to the griffin (Gr. *gryps*, the same word as the Heb. C.) is that of guardian of treasure, and that this was just the office of the C. is manifest from Gen. iii. 24, and Ezek. xxviii. 13–16: hence their post on the top of the Ark (q. v.), and over it in Solomon's temple (1 Kings viii. 6–7), and their multitude of eyes (Ezek. i. and Rev. iv. 6). See Kuenen's *Religion of Israel* (Eng. transl. 1875).

Cherubi'ni, Maria Luigi Carlo Zenobio Salvatore, the last of the great Italian composers, was born 8th September 1760 at Florence. He was educated in Italy, but went to Paris as a young man, and remained there, where he was unboundedly popular, for the rest of his life. Of his very numerous compositions, which include twenty-eight operas, eighteen masses, and numerous smaller works, a few overtures are still heard, and at least two operas, 'Medea' and 'Les Deux Journées.' C. was Director of the Paris Conservatoire, where Auber and Boildieu were his pupils. He died in Paris, 15th March 1842. See Piechianti, *Notisie sulla Vita e sulle Opere di C.* (Mil. 1843).

Cherus'ci, a German tribe, separated from the Suevi by the Silva Bacenis, or Harz Forest, which formed the southern boundary. Under their chief Arminius (Hermann), they totally routed the Romans, commanded by Varus, in the Teutoburg Forest, A.D. 9. Germanicus failed in his attempt to wipe out this stain on the Roman arms, but weakened by internal dissensions, the C. were subdued by the Chatti. About the beginning of the 4th c. they appear among the Frankish confederacy against Constantine, and, still later, Claudian alludes to them in his panegyric on the fourth consulship of Honorius.

Cher'vil (*Anthriscus cerefolium* or *Chærophyllum sativum*), an umbelliferous plant, cultivated for the purpose of using it as an ingredient in soups. It is a native of the continent of Europe, but naturalised in Britain. The pleasantly aromatic odour of its leaves distinguishes it from *A. vulgaris*—a poisonous weed, the leaves of which have a disagreeable odour. The great C., anise C., sweet C., sweet Cicely or myrrh, is *Myrrhis odorata;* the needle C., Venus' comb or shepherd's needle, is *Scandix Pectenveneris;* the parsnip C., *Chærophyllum bulbosum* or *Anthriscus bulbosus;* and the wild C., *Chærophyllum sylvestre.* All the species of *Chærophyllum* are also called C.

Ches'apeake Bay, a deep indentation on the Atlantic coast of the United States, nearly 200 miles in length, with a breadth of from 10 to 30 miles, and an average depth of 9 fathoms. At its mouth are the two capes Henry and Charles, facing each other. Its coast-line is very irregular, and forms numerous lesser bays. The eastern side has a flat and swampy shore; the western is a little higher. Besides a number of smaller streams, it receives the Potomac, Susquehannah, Rappahannock, York, and James rivers, all navigable; and by means of canals it is connected with other great water systems in the United States.

Ches'elden, William, surgeon and anatomist, was born 19th October 1688, at Barrow-on-the-Hill, Leicestershire. He began to lecture on anatomy at twenty-two, and was elected a Fellow of the Royal Society in 1711, and a corresponding member of the Academy of Sciences at Paris in 1729, being the first foreigner honoured with that distinction. As surgeon to the St Thomas's and St George's Hospitals and to Westminster Infirmary, he acquired a brilliant reputation as an operator. He died 10th April 1752. His chief works are *Anatomy of the Human Body* (1713); *Treatise on the High Operation for the Stone* (1723); and *Osteography, or Anatomy of the Bones* (1733).

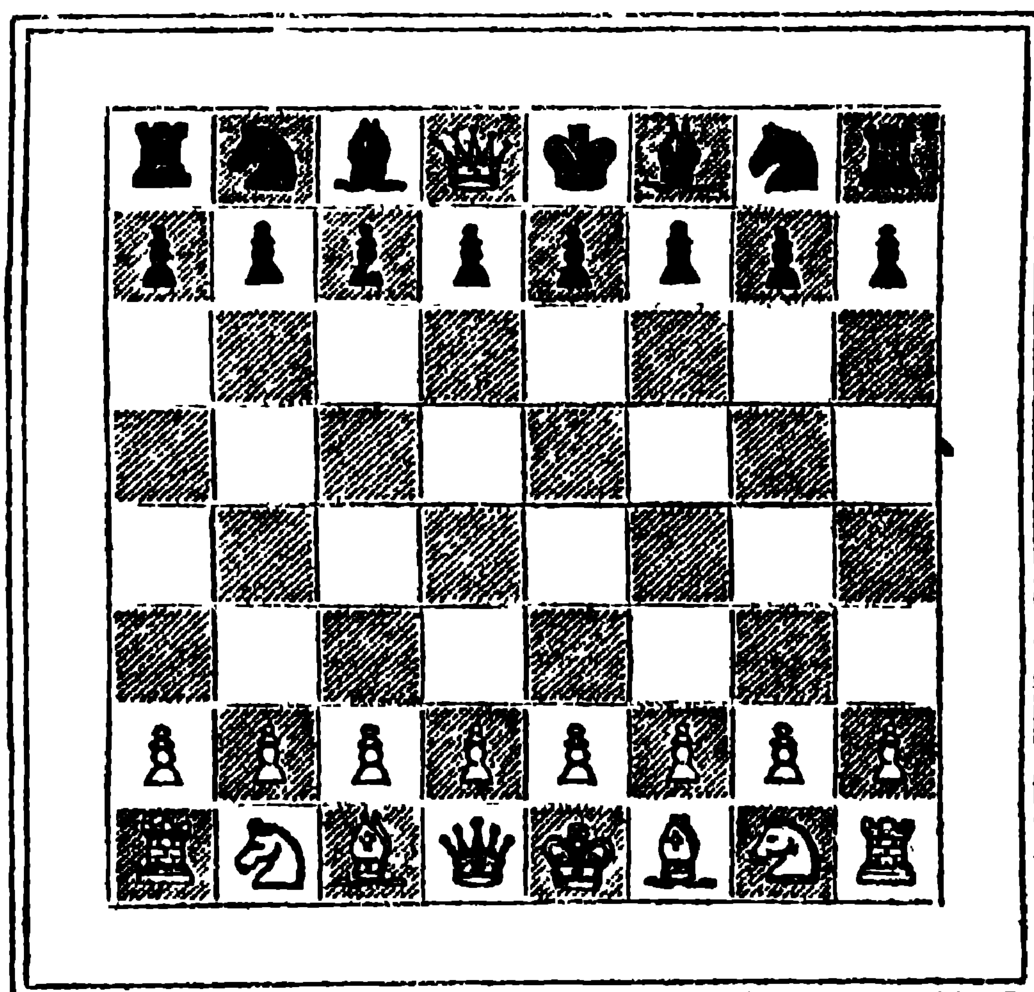
Chesh'ire, a western and maritime county of England, lies between the rivers Mersey and Dee, and has an area of 705,493 acres, and a pop. (1871) of 561,131. It forms, towards the Irish Sea, a flat peninsula, the Wirral, between the estuaries of the great rivers, and inland a plain separating the mountains of Wales from those of Derbyshire. Near the centre it is intersected by an elevated ridge, running from the mouth of the Weaver in the N., to Beeston Castle rock (366 feet high) in the S.W., and in the W. also the county is slightly hilly, besides being bounded in great part by the Mersey on the E. and N., and by the Dee on the W. C. is watered by the Weaver and other navigable affluents of the Mersey. It has a moist climate and a soil fertile and loamy. There is excellent pasturage, and the agriculturists mainly devote their attention to dairy-farming, and especially to cheese-making. In 1875 there were 116,667 acres under all crops, and 347,461 acres of permanent pasture, while there were also 162,466 head of cattle, a higher proportion to the number of acres than in any other English county. As much as 20,000 tons of cheese are produced yearly. C. is almost entirely formed of new red sandstone, containing an inexhaustible quantity of rock-salt, which is extensively mined near Northwich. When illumined by torchlight, the mines, some of them of vast extent, form a splendid spectacle. The other mineral products are coal, copper, lead, cobalt, and limestone. Chester is the capital, and among the other towns are Birkenhead, Stockport, Macclesfield, Staley Bridge, and Crewe. C. is connected with all parts of the kingdom by the London and Liverpool Railway, and by the Crewe, Chester, and Holyhead Railway, and is traversed by the Grand Trunk and Bridgewater Canals. It returns six members to Parliament.

The original British inhabitants were the *Cornavii* or *Cornabii.* Under the Romans the district formed part of the province *Flavia Cæsariensis.* It first became permanently English in 828, when Ecgberht of Wessex compelled the submission of the N. Welsh, and then received the name *Ceastre-scyre* ('shire of Chester'), of which the present form is a corruption. It was an earldom in the reign of Canute, was made a county palatine by William the Conqueror, having eight barons and a Parliament of its own. Henry VIII. abolished (1539) its separate Parliament, and compelled it to send representatives to the national assembly, but its independent jurisdiction did not finally cease till 1831.

Chest'nut, or Chestnut (*Castanea*), a genus of Dicotyledonous trees or large shrubs, belonging to the order *Cupuliferæ.* The common sweet or Spanish C. (*C. vesca*) is believed to have been originally introduced into Sardinia from Sardis in Asia Minor, and from thence to have spread all over the S. of Europe, where it forms in places large forests. A celebrated specimen at Mount Etna measures 204 feet in circumference. In Britain the C. is widely distributed, and attains a good size, but there is evidence for believing that it was introduced by the Romans. It is now one of our trees most valued for its beauty, the excellence of its timber and its fruit, which when roasted is very nutritive and not unpalatable. Among the species of C. may be mentioned the American C. (*C. Americana*), the silvery C. of Java (*C. argentea*), the Tungurrut (*C. Tungurrut*), the fruits of which are eaten boiled or roasted. (See also CHINQUAPIN.) The term *C.* is also given to various trees and shrubs which have no connection with the genus C.—*e.g.*, the horse-C. (q. v.) is *Æsculus Hippocastanum;* the Moreton Bay C., the seeds of *Castanospermum* (q. v.) *australe;* the Tahiti C., *Inocarpusiedulis;* the water-C., *Trapa natans;* wild C. of the Cape of Good Hope, the seeds of *Brabejum;* the yellow C. or C.-oak, *Quercus castanea;* the latter name is also sometimes applied to the timber of *Quercus sessiflora,* of which the woodwork of the roof of Westminster Abbey and various other old buildings is composed, and not, as long believed, of C.

Chess. The origin of this game is lost in antiquity. There seems to be little doubt that a game radically the same as the modern C. was played in the East some thousands of years ago. From Arabia it passed into Spain. In England it seems to have been known before the Norman conquest; but the game as now played may probably rather be said to have grown than to have been invented at any precise period. An elementary knowledge of C. is so generally diffused, and can be so much more effectually given *viva voce* than in a book, that, in the following observations, we will assume the reader to know the power of the various pieces and the object of the game. Any one who has not this knowledge, may acquire it in a few minutes from one who has. He may then enter on the study of this wonderful

BLACK.



WHITE.

The names of the pieces are King, K.'s Bishop, K.'s Knight, K.'s Castle or Rook; Queen, Q.'s Bishop, Q.'s Knight, Q.'s Castle. Each piece has its respective Pawn.

game, in which perfection lies beyond the reach of the human intellect; yet it is not the intellect alone which is concerned in C.-playing. Its results are largely affected by temperament, and by some of the moral qualities. The man of phlegmatic temperament may prevail over the deeper thinker, if the latter be of an excitable temperament, because to be excited is almost certainly to make an oversight, or some other kind of blunder; besides, in losing the game, the excitable man not unfrequently suffers at the same time a more painful loss in the loss of his temper. In losing at whist, or in any game whose immediate issue is largely

affected by chance, the player may blame his bad luck, but in C. there is no such refuge for human self-love.

The annexed diagram shows the names and position of the pieces, with their pawns in front, before opening the game. He will thus be able, by himself, or with a fellow-student, to play over printed games, which, making a good selection, affords the best nourishment to reflection that we know of.

We give a few hints to beginners. The novice who may enter the lists with one a little more advanced than himself will probably find himself defeated in a few moves by what is called *scholar's mate*. Thus white and black move as follows:—White, king's pawn two; Black, king's pawn two; W. king's bishop to queen's bishop's fourth; B. king's bishop to queen's bishop's fourth; W. queen to king's rook's fifth; B. king's knight to king's bishop's third; W. queen takes king's bishop's pawn, and gives checkmate.

Now this mode of attack by queen and bishop is easily defeated, and, when defeated, it puts him who made it to great disadvantage by obliging his queen to retreat, and so causing loss of moves. Supposing W.'s two first moves to have been as before, let B. move his queen's pawn one square, so as to support the king. W. then, as formerly, plays his queen to the king's rook's fifth; B. king's knight's pawn one; thus giving check to the W. queen, who must retreat with very little choice of move. The novice should keep in view that it is not the force which he possesses on which his power for attack or defence depends, but that this depends on his *available* force. This being so, his first endeavour should be to play out his pieces early, to play them in support of one another, and to *castle* in good time. By the latter move, you probably place your king in a better position, and bring the powerful piece, the castle, into play. It is well to endeavour to have the attack; besides the strategical advantage of being the assailant, the position is more inspiriting than that of being on the defence. At the same time, a premature attack, that is, with a large part of your force at home, can hardly succeed. Play as much as you can with those who are more skilful than yourself. Never accept any indulgence when you have made a blunder, nor give any; otherwise, when the situation becomes critical, disputes are sure to arise; consequently, never take nor give back a move. In pursuing your own object, do not forget that your adversary is pursuing his at the same time; do not therefore play until you have, if possible, fathomed the motive of your adversary in making his last move.

The following are the leading laws of the game:—1. If you touch a piece you must play it; but, so long as you retain your hold, you can make any move consistent with its power. 2. If you touch a piece that cannot move, your adversary may compel you to move your king, if it be possible to do so. 3. If you make a false move, your adversary may make you retract it, and move your king, or he may oblige you to make any lawful move he chooses with the piece falsely moved. 4. On the king being checked, notice must be given, or the player whose king is attacked is not bound to notice the check. 5. When, towards the end of a game, one player has just sufficent force to win, he may be called on to win within fifty moves on each side. If he fail to do so, the game is held to be drawn. It sometimes happens that one player has the greater skill when there are many pieces on the board, and that the other again has more skill, when the board is nearly cleared, in manœuvring the pawns into queens, or otherwise. In this case the latter may, to the disgust of his adversary, choose to change queens and minor pieces early in the game. Now every player is entitled to play his own style of game, and to take every lawful advantage. If you do not like another man's style, therefore, the only alternative is not to play with him. Among the numerous books on this fine game we may mention Forbes' *History of C.* (Lond. 1860); Staunton's *C.-Praxis* (1860); Morphy's *Games at C.*; Staunton's *C., Theory and Practice*, edited by R. B. Wormald (1876); and *English C. Problems*, collected and edited by James and W. T. Pierce (1876).

Chest, the part of the trunk known as the thorax, composed of the dorsal vertebræ, the sternum, the ribs, and the costal cartilages. For anatomical description see SKELETON and THORAX.

Chest, Military, is the term used to denote the money and negotiable securities at the command of the commissariat department to meet the expenses of an army in motion.

Chest at Chatham, a fund established during the reign of Queen Elizabeth for the support of maimed and superannuated seamen. It dates from 1590, when all seafaring men in Her Majesty's service consented to a stoppage of from 2d. to 6d. a month out of their pay for this purpose, and as the money was kept in a chest, hence the name of the fund. When the managing office was removed to Greenwich in 1803, it retained the name, and became the *C. at Greenwich*. The monthly payment from the wages of the seamen was abolished in the reign of William IV. From the C. disabled sailors may receive a sum of money in hand, if they can still earn a living; if not, they may receive a pension for one year, for several years, or for life, as the case may be.

Ches'ter, an ancient city and bishop's see, a municipal and parliamentary borough, a county in itself, and the capital of Cheshire, on a rocky height on the right bank of the Dee (here crossed by a splendid stone bridge with a span of 200 feet), 16 miles S.E. of Liverpool. It is a great railway centre, and has one of the finest stations in the kingdom. By the Ellesmere Canal it is also connected with the Mersey. C. is surrounded by a wall 7 or 8 feet thick, now used as a promenade, and affording a wide prospect over a pleasant land. There were once seven towers in the walls, of which only two, Phœnix Tower and Water Tower, now remain. The two principal streets, which cross each other at right angles, are cut into the red sandstone rock to a depth of 10 feet, and the footways are within piazzas called the 'rows,' in front of the shops on the second stories, which are carried back about 16 feet. These 'rows' represent the original level. Flights of steps, at suitable distances, connect the rows with the street below, while beneath are ranges of shops of an inferior description on a level with the street. Numerous ancient houses with timber-framed gables, some of them curiously carved, give the city a peculiarly picturesque character. The cathedral, a massive Gothic structure of red sandstone, is of great antiquity. It grew out of the Abbey Church of St Werburgh, founded early in the 10th c., but has recently been repaired in a style that has marred its former venerable appearance. The *diocese* of C., it may be noted, was not created till after the dissolution of monasteries by Henry VIII. Other churches are St Bridget's, St John the Baptist's, St Michael's, and St Peter's. C. has a grammar-school (King's School), founded by Henry VIII., and under the dean and chapter of the cathedral. St John's Church is said to have been founded by Ethelred in 698. There is in the neighbourhood a fine public cemetery, and in 1867 a public park was opened, the gift of the Marquis of Westminster. The city has manufactures of paint, shot, and lead pipes; iron foundries, and a shipbuilding yard. The chief exports are cheese, lead, copper plates, cast-iron, and coal. C. returns two members to Parliament. Pop. (1871) 35,257.

C. was the *Devana Castra* of the Romans, so called from being half-encircled by the *Deva* or Dee,—the *Caerleon vawr*, 'City of the Great Legion,' of the Cymri. In 828-830 Ecgberht wrested it from the N. Welsh. The Danes captured it in 894, but it was recovered in 904. After the Norman conquest, the Earls of Chester held their courts here. Charles I., it is said, witnessed from the Phœnix Tower the defeat of his troops by the Parliamentary forces on Rowton Heath.

Ches'terfield, Philip Dormer Stanhope, Earl of, an English statesman, man of the world, and author, was born in London, September 22, 1694. In early life he travelled, was appointed gentleman of the bedchamber to the Prince of Wales (1715), and sat in the House of Commons as member for St Germains, in Cornwall, for upwards of ten years. In 1726 his father died, and he entered the House of Lords, where he was noted for his eloquence, and the keenness of his opposition to Sir Robert Walpole, who was then in power. C. was a member of the Broad-Bottom administration, formed in 1744, and was even made a chief secretary of state; but ill-health and deafness compelled him to retire from public life. C. wrote a good deal for some of the periodicals of the times, and was intimate with Bolingbroke, Swift, Pope, &c., and more celebrated for his wit and refined manners than for his statesmanship. His treatment of Johnson, however, provoked from the great lexicographer an outburst of honest, though surly and even exaggerated indignation, which is now chiefly interesting as marking the revolt of literature against the slavery of patronage. C. died March 24, 1773. His most notable work is his *Letters to his Son* (2 vols. 1774), which may be considered even yet the best Eng-

lish compendium of the so-called 'ethics' of fashionable life. The best edition of his letters and miscellaneous literature is that by Lord Mahon (5 vols. Lond. 1845-53).

Chesterfield, a town of Derbyshire, 21 miles N. of Derby, and 156½ from London by railway. It has a fine church (All Saints), and a grammar-school of the 16th c. There are manufactures of lace, merino, silk, cotton, earthenware, and hardware; and the neighbourhood is rich in coal, iron, lead, clay, &c. The trade of the place greatly increased after 1776, when Brindley constructed the *C. Canal*, joining the Trent near Stockwith. C. was the residence of the great engineers, the Stephensons, in their later days. In October 1877 the Marquis of Hartington laid the foundation of a Stephenson Memorial Hall, which is designed to serve all the purposes of a scientific and literary institute, embracing a public hall, a free library, and lecture-rooms for science and art classes. Pop. (1871) 11,427.

Chesterfield Inlet penetrates from the N.W. corner of Hudson's Bay 250 miles inwards. Its greatest breadth does not exceed 25 miles, and it is thickly studded with islets.

Chevalier' (Fr. 'a horseman or knight'), in heraldry, signifies a horseman armed at all points. The term is used generally also in the sense of a knight.

Cheval'ier, Michel, one of the greatest of French political economists and free-traders, was born at Limoges, January 13, 1806. After studying at the Polytechnic School and the School of Mines, he became an engineer in the department of the Nord. He was, however, soon attracted by the speculations first of St Simon and subsequently of Enfantin, and for some writings in the *Globe* journal, which were considered an outrage against Christianity and morals, he was imprisoned for six months. Retracting what he had written, he was sent by M. Thiers on a special mission to the United States, to inquire into the systems of water and railway communication there. The brilliant letters which he wrote to the *Journal des Débats* when on the journey, and which were republished under the title *Lettres sur l'Amerique du Nord* (2 vols. 1836), dispelled many French delusions regarding America, and may be said to have made C.'s fortune. Various posts and dignities were bestowed upon him on his return to France, and in 1840 he was appointed Professor of Political Economy in the College of France. He was for a short time (1845-46) a member of the Chamber of Deputies. Writing vigorously against his former friends the Socialists, C. lost his various appointments on the Republic being proclaimed, but after the *coup d'état* they were restored to him, and since then he has been known chiefly as one of the ablest French advocates of free trade. In 1860 he assisted Mr Cobden in negotiating the important commercial treaty between England and France. In England, which he has visited frequently, C. is very much respected. His latest visit was paid in 1875, when he received a warm reception in the leading commercial centres of the country. Among his works, his *Cours d'Économie Politique* (3 vols. 1842-50), *De la Baisse Probable de l'Or* (1859, translated into English by Cobden), and *Le Mexique, Ancien et Moderne* (1863), are especially admired.

Chevaux'-de-Frise (Fr. *cheval*, 'a horse;' *de Frise*, 'of Friesland'), in defensive fortifications, large and strong pieces—centres or barrels—of timber, traversed with wooden spikes, pointed at each end, and shod with iron, which are used as an obstacle to impede the progress of an advancing enemy.

Che'viot Hills, a range of hills partly in Northumberland and partly in Roxburgh, and thus on the confines of England and Scotland. The highest points are Cheviot Hill in Northumberland, 2684 feet high, and Carter Fell, 2020 feet. The C. H. are in general smooth, and covered with a close sward. Numerous small streams, the Kale, Liddel, Tyne, Till, and Coquet, rise in the green recesses of this pastoral region, which Border ballads and tales have invested with an imperishable romance.

Cheviot Sheep.—A breed which occupies chiefly the Cheviot Mountains, but which has extended itself to the Lothians and to the Ochils. It is easily fed, and yields a large carcass of mutton. Cheviots are well woolled all over the body and the legs. They have white faces, open countenances, and bright, full, sparkling eyes; the lenses are large and very contractile, and the head is stylishly set upon the shoulders, which are rather light; the back is long and straight, and the quarters full. See SHEEP.

Chevreul', Michel-Eugène, a distinguished French chemist, was born 31st August 1786, at Angers (Maine-et-Loire). He was appointed in succession Professor of the Sciences at the Charlemagne College (1813), Director of the dyeing department in the Gobelins manufactory (1824), Professor of Applied Chemistry in the Museum of Natural History (1830), and Director of the Museum for the two quinquennial periods 1864 and 1869. C.'s principal works are *Recherches Chimiques sur les Corps Gras d'Origine Animale* (Par. 1823), and *Considérations Generales sur l'Analyse Organique et sur ses Applications* (1824). Besides these, numerous memoirs on colours and various chemical subjects are to be found in the *Annales de Chimie* and the *Mémoires* of the Academy of Sciences.

Chev'ron (Fr. 'a rafter'), in heraldry, one of the nine honourable ordinaries, which resembles the supports of a roof formed by two rafters leaning against one another. It is otherwise defined as the lower half of a Saltire (q. v.) brought to a point on the upper side. The C. is supposed to betoken the accomplishment by the bearer of something important, such as the founding of a family. A shield divided by a line in the form of a C. is said to be *per C.*, or *party per C.* The diminutive of the C.—half its size, or sometimes rather less—is called a *chevronel*.

In *architecture*, the term *C.* is used to denote the zigzag moulding characteristic of Norman architecture, and also found in the pointed arch of the transition period between the Norman and the Early English styles.

Chevrons, stripes worn on the arm by non-commissioned officers in the army. A lance-corporal or bombardier wears one, a corporal two, a sergeant three, and a staff-sergeant four.

Chev'y Chase, a celebrated ballad in English folklore. It appears in two forms, an ancient and more modern, both of which are given by Bishop Percy in his *Reliques*. The earlier and more rudely constructed, whose original title was *The Hunting a' the Cheviat*, may have been written in the reign of Henry VI. (1422-1461); the later probably dates from the time of Elizabeth. The combat described in the ballad of C.C. is really imaginary, but was probably suggested by the historic battle of Otterbourne, fought between the rival Border nobles Percy (Hotspur) and Douglas in 1388, which is also the subject of a fine ballad. Both forms of C. C. are of English origin, but there is such knightly magnanimity in the narrative, that it became equally popular N. and S. of the Border. High and low alike rejoiced in the valiant strain. 'I never heard,' says Sir Philip Sydney, 'the old song of Percy and Douglas, that I found not my heart moved more than with a trumpet; and yet is sung but by some blind crowder, with no rougher voice than rude style.' The later and more familiar version has been extravagantly criticised by Addison in papers 70 and 74 of the *Spectator*.

Cheyne, George, a Scotch physician and mathematician, born of good family in Aberdeenshire in 1671. He practised at London from 1700 almost till his death, which took place at Bath, April 12, 1743. C. strongly recommended milk and vegetable diet, having found such very beneficial in reducing his own corpulency. His work on *Fluxions* (1703) procured him admission to the Royal Society. Some of his other works are *A New Theory of Fevers* (1702), *Observations on Gout* (1722), *An Essay on Health and Long Life* (1725), and an *Essay on Regimen* (1739).

Chiabre'ra, Gabriell'o, born at Savona, 8th June 1552, was the first Italian lyric poet of his time. Educated at Rome by an uncle, he afterwards took service with Cardinal Cornaro, but owing to an affray in which he avenged his quarrel with his own hand, he was obliged to leave the capital and retire into privacy. Honours were heaped upon him by Pope Urban VIII., by the Dukes of Savoy, Mantua, &c. C. died at Savona, 14th October 1637. His lyrics are considered the best in the style of Pindar and Anacreon that have been produced in Italy in modern times. He also wrote several epic, dramatic, bucolic, and epistolary poems. His *Rime* (best ed. 3 vols. Rome, 1718; 4 vols. Ven. 1731) and *Poesie Liriche* (3 vols. Livorno, 1781), together with his epics, *Delle Guerre de' Goti* (Ven. 1582) and *Amadeida* (Gen. 1620), are contained in the collection of his *Opere* (3 vols. Ven. 1768; 5 vols. 1782).

Chia'na, the name of two small rivers of Tuscany,—one (the anc. *Clanis*) a tributary of the Arno, the other an affluent of the Paglia,—which water the wide expanse of the Val di Chiana,

and have been the means of converting it into one of the most fertile districts of Italy, although prior to the time of Ferdinand III. their unrestricted inundations had rendered it a malarious and marshy wilderness.

Chiaramontè, a town in the province of Catania, Sicily, 33 miles W.S.W. of Syracuse, has a trade in corn and wine. Pop. 9000.

Chia'ri, a town of N. Italy, province of Brescia, on the river Oglio, 14 miles W. of Brescia by railway. It was a walled town till the beginning of the present c., and has a church dating from 1431–80, and important silk manufactures. Pop. 9339. Here, on September 1, 1701, Prince Eugene defeated the Franco-Spanish army commanded by Marshal Villeroi.

Chiaroscu'ro (Ital. *chiaro*, Lat. *clarus*, 'bright, clear;' Ital. *oscuro*, Lat. *obscurus*, 'obscure, dark') is the Italian term for what is generally spoken of as 'light and shade' in painting. It may be described as the art of disposing the lights and shadows of a picture so as to realise the highest picturesque effect. The simplest and crudest form of C. is the violent contrast of light and shade; but the refinements of this quality of painting embrace the light in light, the dark in dark, and all those variations in the use of colours which produce the effects of reflected light, or light tempered by shadow. The first painter who reduced C. to a system was Leonardo da Vinci, and, though the quality is a main constituent of every successful work of art, it has been most effectively used, and may be most profitably studied, in the works of Correggio, Rembrandt, Titian, and Rubens.

Chiava'ri, a seaport of N. Italy, province of Genoa, at the mouth of the Sturla, 21 miles E.S.E. of Genoa. Of its churches, the finest is the *Madonna del' Orto*. C. has manufactures of lace and silk, and important anchovy fisheries; in the neighbourhood are extensive slate quarries. Pop. 10,457.

Chiavenn'a (Ger. *Kläfen*), a town of N. Italy, province of Sondrio, 38 miles N.N.W. of Bergamo. It is situated on the Splügen road, and is the point of junction for the roads to Milan by Lake Como, to the Engadine, and the Swiss canton of the Grisons. C. has manufactures of silk and cotton. Pop. 3845.

Chibon, or Cachobon Resin. See Bursera.

Chica, a red substance obtained by boiling the leaves of *Bignonia Chica*, a native of the banks of the Orinoco and other parts of S. America. It is used by the Indians for painting their bodies, and in the arts for giving an orange-red colour to cotton fabrics. The name *C.* is also applied to *Sterculia Chicha*, the seeds of which are eaten by the Brazilians. C. is also another name for Pito, Poso, or maize-beer—a fermented liquor made from Indian-corn by many tribes of the S. American Indians by fermenting the *chewed* maize. A very superior quality is made by pouring the liquor into an earthen jar containing several pounds of beef, and burying the whole underground for several years. When a child is born such a jar is buried, and only disinterred for the contents to be drunk at the same child's marriage. Vinegar and a spirituous liquor can be also made from it.

Chicacole', the chief town of Ganjam district, in the province of Madras, British India, 415 miles S.W. of Calcutta, and not far from the coast. It is noted for its beautiful muslins. Pop (1871) 15,587.

Chica'go (pron. *Shekawgo*), in Illinois, one of the chief cities of the Union, is situated on the S.W. shore of Lake Michigan at the mouth of a river of the same name. The name is Indian, meaning 'wild onion.' C. stands on the great E. and W. route, and is the centre of an immense traffic. It is perhaps the most wonderful city in the world for its rapid growth and great energy. Living men remember when its site was a swamp, and could have been bought for a trifle. Fort Dearborn was erected in 1803 at the mouth of the river, and the place was a mere frontier post till 1831, when a settlement was made. The town was organised in 1833, and received a charter March 4, 1837. The population in 1835 was 1000; 1837, 4470; 1845, 12,080; 1850, 28,269; 1855, 83,509; 1860, 110,973; 1865, 187,446; 1870, 298,977; 1875, 410,000. The C. river, having two branches, separates the city into three parts, the business portion being on the S. side. The Illinois and Michigan Canal connects the C. river with the Illinois, which enters the Mississippi, thus uniting the navigation of the great lakes with the Gulf of Mexico. The river is bridged and tunnelled, and has some 18 miles of wharfage, and there is a tunnel for 2 miles under the lake, by which the city is supplied with 57,000,000 gallons of water daily. For the better drainage of C. entire streets, with their buildings, were about twenty years ago raised from 4 to 10 feet higher. A terrible fire broke out 7th October 1871, and lasted three days, destroying 17,450 houses, and consuming $196,000,000 of property. A fund amounting to $3,500,000 was subscribed in aid of the sufferers from all parts of the world, and the city was completely rebuilt in about two years. The finest buildings are the court-house, observatory, the colleges, the Douglas monument, and some of the largest hotels in America. C. is the greatest depôt for grain in the world, having an annual export of some 15,000,000 bushels of wheat, 27,000,000 of maize, besides large quantities of corn, rye, and barley. The business of pork-packing rivals that of Cincinnati. There are besides extensive manufactures of machinery, carriages, &c. C. is one of the great railway centres in the Union, about thirty lines meeting there. In 1875 the taxable value of property in the city was $303,705,140. C. has thirty-six public schools, where education is free; two colleges; Baptist, Presbyterian, and Congregational theological seminaries; a law school, several medical institutions, and five daily and thirty-eight weekly newspapers.

Chichen', a town in Yucatan, Central America, about 30 miles W. by S. of Valladolid, and chiefly interesting for the ruins of an ancient city, attesting in its builders a considerable degree of civilisation. It is impossible to conjecture the purpose for which many of the structures were erected. There is a spacious parallelogram formed by rows of small pillars, and a truncated pyramidal mound, 75 feet high, each side of the base measuring about 200 feet, and crowned with a ruined building, of which the sides measure 43 feet by 49.

Chi'chester, a municipal and parliamentary borough, and bishop's see in Sussex, 62 miles S.W. of London by road, and 79 by railway. It consists of two principal streets, with smaller streets at right angles to them, having an elaborately carved octagonal cross at their intersection. The city is surrounded by an ancient wall, a mile and a half in circuit, now lined with elms, and forming a pleasant promenade. The cathedral, an imposing structure, exhibiting almost every variety of Gothic, was built in the 12th and 13th centuries, and has undergone 'restoration' since 1830. It is rich in 'portraits' of English kings and bishops, and contains many interesting monuments; among others, one to Collins the poet, who was a native of the place, and another to Chillingworth. C. has extensive corn and cattle markets, but almost no manufactures. The harbour, 2 miles to the S.W., is connected with the city by a canal. C. returns one member to Parliament. Pop. of parliamentary borough (1871) 9054. C. is considered the *Regnum* of the Romans—the head-quarters of Vespasian, who built the walls; and the coins and temple fragments found here favour the conjecture. But it derives its name from Cissa, a king of the S. Saxons, and appears in the *Chronicle* as *Cissa-ceaster*. Its oldest charter dates from the reign of Stephen.

Chicken-Pox (*Varicella*), an infectious disease almost always confined to children. It seldom lasts more than a week, and is never fatal. There is first an eruption of pimples, which become vesicles on the second day (hence called crystal-pox). On the fourth day these vesicles become scabs, and fall off about the end of a week from the commencement of the disease. A little opening medicine is all the treatment required. C.-P. generally occurs only once in a lifetime, and is essentially a disease distinct from *Small-Pox* (q. v.).

Chick-Pea (*Cicer*), a genus of plants of the natural order *Leguminosæ* (sub-order *Papilionaceæ*). About twelve or fifteen species are known, natives of Southern or Eastern Europe, W. Africa, and Abyssinia. *C. arietinum*, the C.-P. or Egyptian, pea (*Cece* of the Italians, *Garbanzos* of the Spaniards, the *Gram* of India), is a native of the S. of Europe and of India. The leaves of them are covered with glandular hairs excreting oxalic acid—or, according to some, a mixture of oxalic, malic, and acetic acids—which hangs in drops which afterwards crystallise. The seeds are ground into meal and made into cakes, which form a large portion of the food of the natives of the countries in

which the C.-P. is a native, and are also parched and boiled. In Paris they are greatly used in soups. The acid crystals are collected by the natives in India, and considered an infallible cure in cases of indigestion. The herbage is well adapted for feeding cattle.

Chickweed, or **Chickenweed** (*Stellaria*), a genus of plants of the natural order *Caryophyllaceæ*, but generally applied to *S. media*, one of the Stitchworts (q. v.). It is a troublesome weed, gathered to make poultices or to feed birds. The mouse-ear is a species of *Cerastium*. The term *C.* is also sometimes given to *Roccella tinctoria*.

Chicla'na, a town of Spain, province of Cadiz, about 12 miles S.E. of Cadiz. It is built on a hill, and has a fine appearance. C. has a good hospital, manufactures of linen, earthenware, &c., and mineral baths of great repute in the W. of Andalusia. Pop. about 5000.

Chic'opee, a town of Massachusetts, U.S., at the confluence of the rivers C. and Connecticut, 85 miles W.S.W. of Boston by railway. It has some twelve churches, several newspapers, and large manufactures of cottons, woollens, paper, arms, &c. Pop. (1870) 10,500, including the village of C. Falls. C. was formerly called Cabotville.

Chic'ory, or **Succ'ory** (*Cichorium*), a genus of plants belonging to the order *Compositæ*, sub-order *Cichoraceæ*, comprising few species. *Cichorium Intybus*, the common C., is a plant with bright blue flowers, common on waysides and similar localities in some parts of England and most parts of Europe. The leaves are used for feeding cattle, and the blanched leaves as a salad. The roots when roasted form a substitute for coffee, and, indeed, in the opinion of many, if mixed with the latter improve its flavour. They also deepen the colour of the coffee, though when largely used they tend to give diarrhœa. This adulteration is itself adulterated with roasted beans, parsnips, carrots, acorns, logwood, and mahogany, dust, &c., and even, it is said, with the dried and ground bones of horses and bulls, &c. The Endive (q. v.) also belongs to this genus.

Chief (Fr. *chef*, 'head'), in heraldry, one of the nine honourable ordinaries, is the uppermost third, or less than a third, of the field of a shield, bounded by a horizontal line. The C. may be borne with any other of the nine ordinaries except the Fesse (q. v.); it may also be charged with other heraldic figures or devices, which are then said to be *on a C. In C.* means borne on the uppermost part of the shield, even though the horizontal bounding-line is not drawn.

Chief-Justice. See JUSTICE COURTS.

Chiem-See, the largest lake in Upper Bavaria, 42 miles S.E. of Munich, is 10 miles long, 7 broad, and lies 1500 feet above the sea. It receives the Achen and Prien, and is drained by the Alz, an affluent of the Inn. It is rich in trout, salmon, pike, and carp, and is adorned with three fine islands, Herrenwörth, Frauenwörth, and Krautinsel. The Bairisch-Salzburg Railway runs along its southern shore. There is a steamer on the lake.

Chie'ri (the *Carea* of the Romans), an old town in the province of Turin, N. Italy, 9 miles S.E. of Turin, has manufactures of fustians, cottons, linens, silks, &c. It is rich in churches, cloisters, educational and benevolent institutions. Its finest buildings are the Church of St Dominico (1260), and that of Santa Maria della Scala (1405), a large Gothic edifice. Pop. 15,474. C. is frequently mentioned in Italian history. See Cibrario *Delle Storie de C.* (Tur. 2 vols. 1827; 3d ed. 1855).

Chie'ti, the capital of a province of the same name, Central Italy, 78 miles E.N.E. of Rome. It is the seat of an archbishop, and has a cathedral, several churches and convents, a college, a theatre, and remains of antiquity. Its industries in woollen and silk fabrics are unimportant, but its vicinity is extremely productive, and gives rise to a considerable trade. Pop. 20,000. C. partly occupies the site of the *Teate Marrucinorum*, of which traces are still seen. In 1524 St Gaetano established the Theatine order here. The province of C. has an area of 1104 sq. miles, and a pop. (1872) of 339,986.

Chigneo'to Bay, the westerly of the two terminal branches of Fundy Bay, N. America, separated from Northumberland Strait, in the Gulf of St Lawrence, by an isthmus, bearing the same name, 14 miles in breadth.

Chig'oe, or **Jigg'er** (*Pulex penetrans*), a species of *Aphaniptera* or fleas, found in the W. Indies and S. America, and noted for its habit of selecting the skin of the foot or under the toenails as a residence. If the eggs are allowed to be developed in the skin, the parturient female flea acquires a relatively enormous size, her abdomen being greatly distended with eggs; whilst the irritation produces a troublesome ulcer, amidst which the young larvæ appear. The remedy consists in extracting the C., and in applying tobacco-juice lotion to the affected part,—an operation in performing which the W. Indian negroes are said to be very expert.

Chihua'hua, capital of the Mexican state of the same name, lies on a tableland 4500 feet above the sea. It is a well-built town, with regular streets, a large cathedral, several convents, and an aqueduct 3 miles in length. It was founded in 1700, but has been falling into decay since the overthrow of Spanish authority. Pop. 12,000. S. of the town lie the famous silver mines of St Eulalia.—The *State of C.*, separated from Texas, U S., by the Rio Grande del Norte, has numerous mines, but the soil being dry, only the river-bottoms are cultivated, and a strip along the slope of the Sierra Madre. Near the base of this are extensive ruins, known as Casas Grandes. Area, 104,013 sq. miles; pop. (1871) 171,971, mostly Indians.

Chil'blains, blains or boils caused by a chill or cold. The proper treatment consists in keeping the affected parts warm and dry, and applying iodine ointment to them. In strumous children, codliver oil and iron should be given.

Chil'dermas, or **Holy Innocents' Day** (28th December), is held as a festival by the Church of Rome, to commemorate the massacre of the Innocents by Herod. It is said to have been customary to whip the children upon this day, to enforce Herod's crime on their memory. It was thought unlucky to marry or commence any work on this day.

Child-Killing. See INFANTICIDE.

Children, Legal Capacity of. See AGE, CAPACITY, LEGAL, CURATOR, MINOR, PUPIL, GUARDIAN, TUTOR.

Child-Stealing. See ABDUCTION.

Chi-li, or **Pe-chi-li**, a province of the Chinese empire, bounded on the N. by the Great Wall, has an area of 57,283 sq. miles, and a pop. of 38,879,838. It is watered throughout its length by the Pei-ho and its numerous affluents. The Hoang-ho also passes through its southern border. Pekin, the capital of the empire, lies near the Pei-ho in the northern part of the province.

Chil'i, or **Chile**, a republic on the W. coast of S. America, bounded W. and S. by the Pacific Ocean, E. by the Andes, and N. by Bolivia: lat. 25° 30'–43° 20' S.; long. 69°–74° W. It has a coast-line of 1500 miles, and includes several islands, of which by far the largest is Chiloe (q. v.). The divisions, areas, and populations, according to an official census for 1875, are as follows:—

Provinces.	Area in sq. miles.	Pop. 1875.	Capitals.
Chiloe	2,399	64,536	San Carlos
Llanquihue	8,334	48,492	Osorno
Valdivia	10,715	37,481	Valdivia
Arauco	13,873	140,896	Arauco
Concepcion	3,589	151,365	Concepcion
Nuble	3,666	136,880	Chillan
Maule }	3,686	118,457	Parral
Linares }		118,880	Linares
Talca	3,595	110,359	Talca
Curico	2,946	92,110	Curico
Colchagua	3,857	146,889	S. Fernando
Santiago	7,777	362,712	Santiago
Valparaiso	1,665	176,682	Valparaiso
Aconcagua	7,938	132,799	San Felipe
Coquimbo	13,330	157,463	La Serena
Atacama	37,934	71,302	Copiapo
Colonies of Magallanes	...	1,144	...
	128,004	2,068,447	

The province of Linares was separated from that of Maule by a law of December 11, 1873. Araucania (q. v.) is excluded from the above table.

Physical Aspect, &c.—The country, stretching N. and S. in a long narrow strip, is cut off from the rest of the continent by the Andes, which here form a single magnificent ridge. It consists of numerous offsets of the great range, and of intervening valleys of great fertility and beauty, which open upon the sea. In the N. is the barren and rainless waste of Atacama, while over the rich central region the snow-covered peak of Aconcagua (q. v), the giant of the Chilian Andes, towers to a height of 22,422 feet. There are sixteen active volcanoes, such as Chillan and Villarica, both of which are 16,000 feet high; and the coast-line has been greatly extended of late years by the gradual upheaval which the country is undergoing. Among the rivers are the Biobio (q. v.), the Maule, Calacalla, Noble, Cauthen, and innumerable smaller streams. The climate in the N. is hot and dry, but in the rest of the country is delightfully tempered by prevailing sea-breezes. On the whole, C. is singularly healthy, although the temperature often rises to 95° in the shade. January and February are the hottest months, and the rainy season, by which Atacama is almost unaffected, lasts from April till August intermittently.

Natural Products, &c.—The base and slopes of the Andes are clad with forests of fine timber trees, and wild apple and pear trees grow in abundance. Agriculture is rapidly improving, the principal crops under cultivation being maize, wheat, barley, and other European grains. The only hemp grown on the W. side of S. America is in C., which is also the original home of the potato. In the dry region of the N. there is a luxuriant yield of grapes, olives, figs, pomegranates, oranges, peaches, melons, &c. C. is plentifully stocked with cattle and goats, while its principal animals of prey are the puma or American lion, and the condor, a splendid Andian species of the vulture.

Geology and Mineralogy.—The upper portion of the Chilian mountains consists mainly of schistose rocks, the lower offsets of granitic, covered with tuff and lava in the vicinity of the volcanoes. Everywhere are seen hornblende, mica-schists, clay slates, and basaltic and felspathic porphyrites of deep red and brown tints, while limestone rocks occur in numerous places. Quartz is usually found in conjunction with veins of the metals, which exist in great abundance, and constitute the chief wealth of the country. The principal minerals are gold, silver, copper, lead, iron, tin, coal, and precious stones, such as agate, jasper, rock-crystal, &c. Atacama with its vast mineral resources has been brought within the reach of mining enterprise since the recent introduction of railways.

Means of Traffic, Commerce, &c.—C. is now placed in direct communication with Europe by means of a telegraph line from Buenos Ayres, which crosses the Andes by the Paso de la Cumbre, 12,178 feet high. In 1875 the various railway lines throughout the country had a total length of 616 miles, and a project was on foot to extend the Copiapo line across the Andes, and unite it with that from Cordova in the Argentine Republic. The estimated cost of the scheme is £6250 a mile, and the distance is 400 miles. C. has considerable foreign commerce, chiefly with Britain, and the principal articles of export are copper and silver ore, wheat, flour, raw cotton, guano, tallow, and hides. In 1874 the exports by land and sea amounted to £7,268,000, and the imports to £7,762,000; the number of ships that entered the various ports being 5827, of 3,790,000 tons. The value in 1873 of the minerals (chiefly copper) exported was £3,313,000, and of agricultural produce and cattle, £3,187,000. C. has manufactures of linens, brandy, earthen and copper wares, &c.; and the chief towns are Santiago (the capital), Valparaiso, Copiapo, Caldera, Chanaral, Chillan, Concepcion and Talca. A great international exhibition was held at Santiago in the end of 1875.

People, Government, &c.—In the N. and central provinces the inhabitants are mostly whites or Chileños, of Spanish origin, distinguished by their enterprise and industry. The S. is almost wholly occupied by Indians. According to the constitution of 1833 the government is a republic, and the legislature consists of two houses. The public debt, which is chiefly contracted on account of railways, amounted at the end of 1873 to £10,779,404. In 1874 the army comprised 2000 infantry, 712 cavalry, and 804 artillery; while the navy numbered two powerful ironclads and ten small vessels. The prevailing religion is the Roman Catholic, but other churches are protected by a law of 1865.

History.—The country was overrun by Diego Almagro after the conquest of Peru in 1535, and later was made a general-captaincy, with an extended dominion stretching to Cape Horn. In 1810 began the revolt against Spain, which continued till 1818, when the decisive battle of Maypo gave C. her independence. The republic has since, in spite of repeated internal dissensions, firmly established its position as the most stable and enlightened of the S. American governments. In 1864, after Spain had wrested the Chincha Islands from Peru, it declared war against C. for having preserved a strict neutrality. Several of the ports were bombarded, the whole coast was blockaded for several months, and the attempt to regain possession of C. was only abandoned after much useless destruction of property. See *Geographical, Natural, and Civil History of C.* (2 vols. Middletown, 1808), and Gay, *Historica Fisica y Politica de C* (vols. i.-xviii., Par. 1844-61).

Chili Nettle. See LOASACEÆ.

Chili Pine. See ARAUCARIA.

Chillianwall'a, a village of the Punjab, 5 miles from the left bank of the Jhelum, and 85 miles N.W. of Lahore. Here, on 13th January 1849, Lord Gough defeated the Sikhs, after an obstinate engagement. An obelisk has also been erected at C. to the memory of those who were slain in the two wars with the Sikhs.

Chill'icothe, the capital of Ross county, Ohio, U.S., on the Scioto river, 96 miles N.E. of Cincinnatti by railway. It has large manufactures of machinery, and is the trading centre for the rich farming country bordering on the river. Formerly capital of the State, C. is finely built and wealthy. Pop. (1870) 8920.

Chill'ies. See CAPSICUM.

Chill'ingworth, William, a famous divine, called 'the immortal C.,' born in October 1602 at Oxford, and had Laud for his godfather. While studying at the university of his native city he became a Roman Catholic, and went to Douay, but afterwards returned to the English Church, mainly through the persuasions of Laud, and in 1637 published his chief work, *The Religion of Protestants a Safe Way to Salvation*, in reply to the treatise of a Jesuit called Knott. He accompanied the King's troops during the civil war, was taken prisoner at the siege of Arundel, and died January 30, 1644. C. was an able controversialist, but his clear, close reasoning is weakened by an immoderate dread of fallacy. He denounced persecution, and maintained that Scripture, and not Church authority, was the basis of Protestant faith. *The Religion of Protestants* is remarkably bold and tolerant, the first clear-ringing defence in the English tongue of the liberty of private judgment. In later times C. was a favourite with latitudinarians like Locke and Tillotson. A complete edition of his works was published by Birch (3 vols. Clarendon Press, 1838). See *Masters in English Theology* (Lond. 1877).

Chillon, a famous fortress, in the canton of Vaud, Switzerland, at the E. end of the Lake of Geneva, 6¼ miles S.E. of Vevay. It stands on an isolated rock, at a distance of 62 feet from the shore with which it is connected by a drawbridge. It is mentioned in documents of the 12th c., but the date of its foundation is not exactly known. Pietro of Savoy (Charlemagne the Little) converted it into a fortress in 1248. Bonnivard, prior of St Victor, Geneva, was imprisoned here from 1530 to 1536. Byron's *Prisoner of C.* has invested the castle with an undying interest. It is now an arsenal. See Vulliemin, *C., Étude historique* (Lausanne, 1851).

Chiloë, an island forming a province of Chili, is situated in the Gulf of Ancud, is 120 miles long from N. to S., about 60 broad, and has an area of 2399 sq. miles, and a pop. (1875) of 64,536. It is a huge mass of volcanic rock, rising in no part higher than 2600 feet, and possesses a rich soil, which is almost entirely clad with forests, chiefly of a bastard cedar. The coast-land is cultivated, and yields wheat, barley, potatoes, and fruits. There is a considerable export of grain and timber. San Carlos and Castro are the principal towns, the former being the capital, and having an excellent harbour.—The *Archipelago of C.* includes sixty other small islands, only half of which have inhabitants. The principal of these islets are Lemuy, Calbuco, Llaicha and Quinchao.

Chilognath'a and **Chilop'oda**, the orders of the class *Myriapoda* (q. v.).

Chil'tern Hills, a chalky ridge across England, from Wilts, through Berks, Oxford, and Bucks, to the border of Suffolk. The range is in great part from 15 to 20 miles in breadth, and its greatest height is Wendover, with 905 feet of an altitude.

Chiltern Hundreds.—The office of 'Steward of the C. H.' was established under the crown for the purpose originally of suppressing the bands of depredators who infested the forests of the Chiltern Hills. It began, however, to serve its singular modern political purpose about 1750. A member of the House of Commons is unable to resign his seat unless through his acceptance of a place under the crown, but the now nominal appointment to the stewardship in question continues to be regarded as such an office, and thus affords a means of resigning. This office is almost invariably granted when applied for; no salary attaches to it; and it is usually resigned immediately after acceptance. It is the only office of which the Chancellor of the Exchequer has the patronage.

Chimæ'ra, a fire-breathing monster of Greek mythology. Homer represents it as of divine origin, and as having the front of a lion, the tail of a dragon, and the body of a goat. It was killed by Bellerophon. In works of art it is represented as a lion with a goat's head springing from its back. The myth of its breathing fire is sought to be explained by a reference to the volcano of C. in Lycia, mentioned by Pliny and Mela. The name has since been given to any irrational product of a disordered fancy.

Chimæra, a genus of Elasmobranchiate fishes, forming the type of the sub-order *Holocephali*. These forms, represented by the *C. monstrosa* or 'King of the Herrings,' and by the *Callorhynchus Australis* of the S. Seas, possess a persistent notochord in place of the spine. The jaws are bony, and the scales are of the placoid kind. The mouth exists at the extremity of the head, and a single gill aperture only exists. The ventral fins are situated posteriorly, and the tail is heterocercal. Fossil species allied to the C. (genera *Elasmodus*, *Ischiodus*, &c.), occur in Mesozoic and Tertiary rocks.

Chiman'go (*Milvus C.*), a species of Raptorial birds, belonging to the *Polyborinæ* or *Caracaras* (q. v.), found in S. America, and, according to Darwin, commonly associated in its habits of feeding on garbage with the Carancha (*Polyborus Brasiliensis*). It possesses all the distinctive characters of the *Polyborinæ*, and by Darwin is said to be 'generally the last bird that leaves the skeleton' of its prey. He adds, that it 'may often be seen within the ribs of a (skeleton) cow or horse like a bird in a cage.'

Chimaph'ila. See WINTER GREEN.

Chimbora'zo, the loftiest summit in the Andes of Quito, is 21,424 feet above the sea, and was once believed to be the highest mountain in the world. It is an extinct volcano, and has a trachyte peak, covered with perpetual snow. Humboldt (23d June 1802) ascended C. to within 2138 feet of its top, and Boussingalt and Hall (15th and 16th December 1831) to within 1729 feet. The assertion of the French traveller Remy that he reached the summit (3d November 1856) in a mist 'without knowing it' is not generally credited.

Chimere', the black satin robe worn by a bishop, on which the lawn sleeves, or the sleeves of a rochet, are sewn. In the time of Henry VIII. and Edward VI. it was scarlet, and was probably the sleeveless habit of a D.D. Objections were taken to this colour by Dr Hooker, and the colour was changed to black.

Chimes, a set of bells in a church (or other) tower, also music performed upon such bells. See BELLS.

Chim'ney (Fr. *cheminée*, Ital. *camminata*, from Lat. *caminata*, der. of *caminus*, used by Vitruvius for a chimney). In the dwelling-houses of the ancients, the smoke and heated gases from the fireplace were, in general, left to find their way out of a room by openings in the roof or walls, and it is very doubtful whether either the Greeks or the Romans used any more satisfactory method than this. Modern chimneys were not known in this country until about the 12th c., and it is not until nearly four hundred years later that they appear to have been thought essential to every fireplace in a house.

The business of a C. is twofold—first, to carry off the smoke, and prevent its disagreeable presence in the room; and, second, to create a draught through the fuel, so as to consume it the more quickly and effectually. This latter function of the C. depends on the fact that hot air is bulk for bulk lighter than cold, so that when any column of heated air is allowed to communicate freely with the atmosphere at top and bottom, the cooler air continually pushes the hot air upwards, and thus keeps up a circulation.

If a C. be well designed in the first place, by having an opening as nearly as possible over the fire, a somewhat contracted neck, and a tolerably straight flue, it should never give any trouble by smoking. But if these points have been neglected, it is often very difficult so to alter the defectively formed C. as to prevent smoking. This nuisance is caused by down-draughts, which most frequently result from the position of the top of the C. being such as to expose it to side currents and eddies of air. The most simple means of neutralising the effect of these is the fitting of revolving cowls upon the C.-pot, these cowls being so arranged that their openings always point away from the direction from which the wind is blowing. It is only in some few cases that the alteration of the flue or fireplace becomes absolutely necessary.

The chimneys of large factories are sometimes of extraordinary height, and their construction presents difficulties of no mean order; that belonging to Messrs Tennant & Co. of St Rollox near Glasgow, for instance, is amongst the highest structures in the world. It is 454 feet above the ground, and 14 feet more from its foundation. It is 32 feet in diameter at the bottom, and 2 feet 8 inches thick, and tapers to 12 feet 8 inches diameter at top, by 1 foot 2 inches thick.

The chimneys of steamers are commonly made, for convenience and lightness, of wrought iron, as also are those of locomotives. For factory chimneys, however, this material is not nearly so well adapted as the brick or masonry almost invariably used in their construction.

Chim'panzee, one of the highest or Anthropoid apes, included in the *Catarhine* section of the order Quadrumana (q. v.). The C. is the *Troglodytes niger* of naturalists; the Gorilla (q. v.) being the *Troglodytes gorilla*. This ape occurs chiefly in Western Africa, and inhabits much the same territory as the last-mentioned animal. The hair is nearly black in colour—hence the specific name *Niger*; but age is said to tint it with grey. The hair of the chest and abdomen is thinner than that of the limbs; and the hairs of the arm and forearm meet in opposition at the elbow to form a tuft, as in the gorilla. The nostrils are flat and oblique, and the muzzle projects. The C. approaches the human type of structure most nearly in the character of the skull, in its dentition, and in the relative size of the arms. It attains a height somewhat greater than that of the orang, which rarely exceeds 4½ feet in height. The arms in this species measure half as much again as the height of the body. The hand is equal to, or may be a little larger, than the foot; and as the sole can be placed flat on the ground, the C. can stand erect and run. Like the gorilla and orang, it often rests itself by leaning forward on the knuckles of the hand. It appears to be gregarious in habits, and its food consists chiefly of vegetable matter.


Chimpanzee.

China. See CHINESE EMPIRE.

China Bark, a common name for Cinchona Bark (q. v.), especially in Germany.

China Grass. See BŒHMERIA, CORCHORUS, and SIDA. C.-G. cloth is now used to some extent in Europe, being valued for its transparency and glossy appearance.

Chinande'ga, a town of Nicaragua, Central America, on a small river of the same name, 10 miles inland from the Pacific, is scattered over a wide area, and has a trade in cotton, sugar, maize, hides, &c. Pop. 10,000.

China Root, the tuber of *Smilax China*, a kind of Sarsaparilla (q. v.), a native of China, Japan, and E. Indies. C. R. is possessed of diaphoretic properties, and has been recommended in Syphilis (q. v.).

China Ware. See PORCELAIN.

Chin'cha Islands, three in number, belonging to Peru, and situated about 12 miles from the coast, in Piseo Bay, lat. 13° to 14° S. They have since 1840 been famous in Europe for their great guano deposits, which, since 1836, have formed the principal source of Peruvian wealth; but which are now becoming rapidly exhausted. They are named respectively N., Middle, and S. Islands, have an aggregate area of about 400 acres, are rocky and precipitous on the landward side, destitute of water, and without a trace of vegetation. From time immemorial they have been the resort of vast flocks of penguins and other seafowl, the droppings from which, covering the surfaces and filling the crevices of the rocks, have formed immensely valuable stores of guano. The first cargo of guano was shipped to England in 1840, and it is calculated that the deposits will last till about 1880.

Chinchill'a (*C. laniger*), a genus of Rodent (q. v.) quadrupeds, usually included in the family of the *Caviidæ* (Guinea-pigs, &c.), and found in mountainous districts of Peru and Chili. The average length of the C. is 14 or 15 inches including the tail, which makes up one-third of the measurement. The hind limbs are much larger than the fore, and the tail is clothed towards its tip with long hairs. The fur is of a light-grey on the upper, and whitish-grey on the under parts, and is of very fine texture. The food consists of roots, which it digs out by means of its powerful paws. When feeding, it sits on its hind limbs, and conveys the food to its mouth with the fore paws. There are five toes on the front, and four on the hind feet The ears are large and prominent. The fur is manufactured into muffs, mantles, cloak-trimmings, and other articles.



Chinchilla.

Chinchilla, a walled town in the province of Albacete, Spain, 10 miles S.E. of Albacete; has manufactures of woollens, linens, leather, glass, &c., and an old church in which there are several fine pictures. Pop. 7500.

Chin-Chin, a gummy varnish used in China and Japan, and believed to be derived from *Plocaria tenax*.

Chinchon', a town in the province of Madrid, Spain, 25 miles E.S.E. of the metropolis, overlooks the Tagus, and has slight industries of linen, leather, and earthenware. Pop. 5400.

Chincho'na. See CINCHONA.

Chindwar'a, chief town of an executive district of the same name, Nerbudda division, Central Province, British India, is situated at an elevation of 2100 feet, has a clear, healthy climate, and attracts many invalids. Pop. (1872) 9185.

Chinese Empire, the oldest, most populous, and, after the Russian and British empires, the greatest in territorial extent in the world, may be said to occupy the whole of the eastern division of the Asiatic continent S. of Asiatic Russia and E. of British Burmah. Besides *China Proper*, it includes Manchuria (q. v.), Mongolia (q. v.), and Thibet (q. v.). *Eastern Turkestan* (see CASHGAR) has for the present thrown off the Chinese yoke and achieved independence; but the suzerainty of the Chinese emperor is acknowledged by the tributary kingdoms of Corea, Burmah—which in 1875 resorted to its former custom of paying tribute to the imperial treasury, and thus reassumed the duties and obligations of a Chinese feudatory—Siam, and the minor states of the Indo-Chinese peninsula, though in Cambodja and Cochin-China Chinese influence is being gradually superseded by that of France. Thibet and the *extra-mural* states of the empire—that is, those lying to the N. of the Great Wall of China, viz., Manchuria and Mongolia, as well as the kingdoms and states which pay tribute, but over which China exercises no direct administrative control—are each treated separately, and attention is here directed exclusively to the central and sovereign state of the empire, China Proper.

China, *Tsin*, or *Shih-pā-sang*, 'the eighteen provinces,' was called *Chin* by the inhabitants of India, from whom the Spanish and Portuguese adventurers of the 16th c. (the first Europeans to open up the Indian Seas to commerce) obtained some knowledge of the country, the Indian name of which they altered into the Latinised form of *China*. The Tartar tribes in the N. gave to the country the name of Katai or Cathay, by which it was vaguely known in Europe during the middle ages. It is also called the 'Middle Kingdom,' a name which is appropriately applied to the central and principal state of an extensive empire. China Proper is divided into eighteen provinces, exclusive of the frontier province of Shing-king (q. v.) between the province of Chi-li and the Corea, and of the islands of Hainan and Formosa. In configuration it is singularly compact; it is of nearly uniform length and breadth; its coast-line is regular, with no deep indentations, and with only two notable peninsulas, Quang-tung or Lien-chow peninsula between the Gulf of Tonquin and the China Sea, and the Shan-tung peninsula between the Gulf of Pe-chi-li and the Yellow Sea. But though there are few deep indentations, there are numerous inlets, and the excellent harbours on these and on the mouths of the rivers are almost countless. The almost numberless islets that stud the E. coast lie as a rule close to the shore, while of the two great islands, Hainan, in the extreme S., is separated only by a narrow strait from Quang-tung peninsula, of which it doubtless at one time formed a part, while Formosa, in the E. Sea, is separated from the mainland by Fu-kien Channel, about 100 miles broad.

Boundaries, Area, Population.—China Proper is bounded on the N. by Manchuria, Mongolia, and the dependent parts of Chinese Tartary; on the W. by Thibet and Burmah; on the S. by Cochin-China or Anam and the China Sea; and on the E. by the Gulf of Pe-chi-li and Yellow and Eastern Seas—arms of the N. Pacific Ocean. Its area has been usually stated at about 1,300,000 sq. miles, and Williams estimates it at nearly 2,000,000. The following is a list of the provinces, with their areas and populations, according to the last estimate (1842):—

Provinces.	Areas in sq. miles.	Populations.
Pe-chi-li	57,283	38 879,838
Shan-tung	53,779	29,529,877
Shan si	65,969	17,056,925
Ho-nan	66,933	29,069,771
Kiang-si	40,140	39,646,924
Ngan-hoi	54,001	36,596,988
Kiang-si	68,596	26,513,889
Fu-kien	45,761	22,799,556
Chi-kiang . . .	35,071	8,100,000
Hu-pé	69,480	28,584,564
Hu nan	83,229	20,048,969
Shen-si	81,216	10,309 769
Kan-su	260,599	19,512,716
Sze-chuen	185,053	35,000,000
Quang-tung . . .	90,246	20,152,603
Quang-si	77,857	8,121,327
Yun-nan	122,461	5,823,670
Quei-chu	66,759	5,679,128
Island of Hainan . .	13,976	2,500,000
Island of Formosa .	14,982	3,020,000
	1,533,991	404,946,514

Mountains, Rivers, Surface.—The physical geography of no country of equal extent is less complex than that of China. The gradually lowering spurs of the vast mountain system of the Himalaya enter the country from Thibet on the W., and traverse it in two main ridges, the general trend of which is from W. to E., but which throw out a number of lateral branches. Of these two main ridges, the *Nan-ling* ('Southern Range') extends in broken chains over the province of Yun-nan and Kuei-chow, exhibiting rugged mountains and fertile and abundantly-watered valleys. From the eastern border of Quei-chu the Nan-ling extends E. and N.E., forming the frontier line between the provinces of Quang-tung and Kiang-si on the S. and those of Hu-nan and Hu-pe on the N., and finally bending E. and forming the southern boundary of the basin of the lower Yang-tse. Another branch of the Nan-ling stretches E.S.E. from the southern border of the province of Hu-nan, forming the northern limit of the wide valley of the Si-kiang river, which ultimately becomes the Chu-kiang or Canton river. The *Pe-ling* ('Northern Range') enters the province of Sze-chuen from the W. In this province the mountains are irregular, and numerous peaks, especially in the sub-range known as the Snowy Mountains, rise above the line of perpetual snow. From Sze-chuen the main chain traverses the province of Kan-su, where there are several subsidiary ranges, and where the valleys are numerous but small in extent. The chain crosses Shen-si into Shan-si, through the S. part of which it is continued into Hu-nan. The range seems again to cross upon the eastern bank of the Hoang-ho, and occupies

the greater part of the province of Shan-si. The generally eastward trend of these mountain ranges determines the courses of the great rivers. The principal are the Si-kiang or Chu-kiang, flowing eastward S. of the Nan-ling range, through the southern provinces to Canton; the Yang-tse, flowing E. through the great central valley of the country between the Nan-ling and the Pe-ling mountains; and the Hoang-ho, flowing, in its lower course, through the valley to the N. of the main branch of the Pe-ling range. The other important streams of the country are either tributaries of these great rivers, or, like them, they flow eastward into the China, Eastern, or Yellow Sea, or into the Gulf of Pe-chi-li. The surface of the country presents every variety, from Alpine regions, where loftier peaks than those of Switzerland tower high above the line of perpetual snow, to far-extending tracts, flat, alluvial, and fertile as the Netherlands, but infinitely more extensive. From the western frontier of China (about 100° E. long.) eastward to the middle of the country, or to about the meridian of 112° E., the surface is mountainous. In the N., especially in the province of Shan-si, the mountainous region extends 100 miles farther E., or to about the meridian of 114° E. In this western half of the entire area, immemorial forests clothe the mountains, and immense beds of coal occur. E. of this mountain region, the middle of the country is occupied by the great alluvial plain of the Yang-tse and Hoang-ho, extending northward from lat. 30° to 40° N. The Great Plain of the basin of the lower Yang-tse is about 700 miles in length, and varies in breadth from 150 to 500 miles. Its area (210,000 sq. miles), though greater than that of France, forms only a sixth part of China, yet it contains nearly one-half of the entire population, and is the most densely inhabited portion of the earth's surface. In the six fertile provinces that lie either wholly or in great part within it, 180,000,000 persons are supported. The remainder of the country is hilly or undulating. The lakes of China are numerous, the chief being the Tong-ting Lake in the N. of Hu-nan, about 250 miles in circumference, Lake Po-yang in Kiang-si, 180 miles in circumference, and the Tai-hu, or Great Lake, near Shanghai, 150 miles in circumference, and from 10 to 15 feet deep. All the lakes and rivers are abundantly stored with fish, and multitudes of families living on their banks, or in junks or floating houses on their waters, are maintained by the fisheries.

Geology and Mineralogy.—Owing to the exclusive policy of the Chinese Government, and to the deep-seated dislike of the officials to foreigners, the geological character of the country has remained almost wholly unknown down to our own day. Within recent years, however, missionaries and merchants have penetrated the empire in various directions, and the more salient facts of the geology of the country are becoming gradually known. The Rev. A. Williamson, in his *Journeys in N. China*, 1870, R. Pumpelly, and Baron Reithofin, have recently made valuable contributions towards a view of the geology of the country. The mountain system of China, the outline of which has already been given, consists for the most part of granitic and metamorphic rocks, and to this bold and broken formation the rugged and picturesque character of so much of the scenery of China is due. In the valley of the Yang-tse cretaceous rocks and Tertiary beds occur. All classes of rocks containing metalliferous veins are largely present in this country. The whole of Northern China, embracing the greater portions of the provinces of Shan-tung and Chi-li, and the whole of the provinces of Shan-si, Shen-si, and Kan-su, may be described as one vast and inexhaustible coal-field, while smaller fields occur in almost every other province. These strata are associated with varieties of iron ore, among which there are great fields of black oxide, the finest ore in the world. Fine limestone occurs in all directions, and gold—especially abundant in Yun-nan, in the S.W.—silver, tin, and copper are found in all the 'hill' provinces. In the province of Shan-tung there are four great coal-fields; and coke, which is manufactured in immense quantities, is used for smelting silver, and for other processes requiring great heat: iron, gold, and galena abound in numerous localities. Tertiary deposits cover the plain of Chi-li, and among the hills limestone, granite, and metamorphic rocks prevail. There are numerous coal-mines, very inefficiently worked, and gold, silver, iron, and tin exist in many localities. In Shan-si, in which the mineral resources are great and varied, coal—bituminous, anthracite, and lignite—and silver, copper, and iron are plentiful. In Shen-si, Kan-su, and Ho-nan, all the minerals and metals named, together with quicksilver, exist in large quantities. Gold is common in the majority of the streams, and jade, agates, amber, iron pyrites, sulphur, and petroleum are obtained in many places. Gold and the other valuable metals are also pretty generally distributed on the alluvial flats and slopes of the western mountains trending N. and S., as well as in the southern province of Quang-tung. As a mineral product of China, porcelain is of the first importance in beauty and utility. The porcelain manufactories of the country are few in number, but are upon a large scale. The largest is named King-tu-ching, in Kiang-si, near Lake Po-yang, where there is an inexhaustible supply of the peculiar clay and silica from which the best porcelain is made, together with extensive coal-mines, whence fuel is obtained for the furnaces. The curious loam-terraces in the northern provinces, everywhere excavated into houses and villages, mark, according to Pumpelly and Williamson, the sites of former lakes and the channels of streams, and especially of the great river-system of the Hoang-ho or Yellow River, the course of which has suffered deflection from natural causes within our own time, and which appears to have been subject to similar vicissitudes prior to as well as during the historic period.

Climate, Soil, and Agriculture.—Extending in lat. from 18° to 44° N., and from long. about 98° to about 125° E., it is only natural to expect that the climate of China should vary in the different quarters of the country. The climate of the coast districts is widely different from that of the remote interior, and even among the coast districts themselves the climate varies, the meteorological conditions being quite different at Canton in the S. and at Pekin in the N. A peculiarity of the climate in general is the low average of the temperature, taken in connection with the fact that a part of China is within the tropics, and that the latitude even of Pekin, in the extreme N., is a degree to the S. of that of Naples. The mean annual temperature of Canton and Macao, which are within the tropics, is no higher than what is usually registered in places on the 30th parallel; while the mean annual temperature of Pekin is ten degrees lower than that of Naples. In winter severe cold is experienced in the northern provinces, though in midsummer the heat is oppressive. The average rainfall is 70 inches in the extreme S. There the N.E. monsoon commences in September and continues till February. The S. monsoon, which brings with it the annual rains from the heated ocean to the S., commences in March or April. The hottest months are July, August, and September. In these months the heat is oppressive and exhausting, and it is at this season, when the air is in a condition of extreme rarefaction, that the dreaded typhoons occur. China is a perfect hotbed for virulent and endemic diseases. This is accounted for by the extreme heat and humidity of the climate in summer, the absence of proper sanitary arrangements in the crowded houses of the swarming rivers, and the thronged villages and towns. Famine, arising from the frequent droughts and inundations, too frequently accompanies disease, and fearful destruction is often caused among the people who live afloat by the typhoons that annually visit the southern coasts. The estuary of Canton river is especially subject to these hurricanes; and in August 1862 it was calculated by the Chinese authorities that not less than 60,000 inhabitants were drowned or killed by falling houses during a typhoon of fourteen hours. These tempests, though most frequent in the S., ravage the harbours all along the E. coast as far N. as Shanghai. In the northern and inland provinces of China the climate is pleasant, and in many localities delightful. The *soil* of the country is as various as its climate. There are tracts of champaign country like France and Belgium, swampy districts like Holland, and barren mountain regions. The richest soil is formed by the detritus of the innumerable rivers, and is found occupying immense tracts in the basins of Hoang-ho and Yang-tse, and composing the substance of their deltas.—*Agriculture*, the chief industrial pursuit of the Chinese, is considered a choice occupation, not only by the people but by the nobles and learned men, while even the Emperor himself condescends to plough a furrow on the occasion of the great annual festival of husbandry. All the land is vested in the Emperor as universal landholder. For the best land in the rich district near Canton a tax amounting to ten or twelve shillings an acre (including the collector's illegal levies) is paid, but in the inferior districts the tax amounts to only two or three shillings an acre; while those who undertake to till waste lands are free to do so without payment, and are even assisted by Government in cases where expense is involved in bringing the land to a

condition of productiveness. The great proportion of the farms are of from 5 to 10 acres. Holding directly of the Emperor, the peasant of China is subject to no compulsion, exaction (except in the case of the collector above mentioned), or control. There are no game-laws, and the fisheries on the rivers and lakes are open to all. 'In no part of Europe,' says Mossman, 'is the agriculturist so independent as in China, and as a class they will compare favourably with the most advanced peasantry in England for intelligence and good conduct.' The implements and methods of agriculture among the Chinese are very rude and imperfect. Their plough makes a furrow only 4 inches in depth, and the hoe is used for almost every operation in farming and gardening; but owing to the immense number of the labourers, and the enthusiasm with which the pursuit is followed, the system is effective—all available lands are cultivated, and the greatest ingenuity and economy is everywhere observable. The land is abundantly supplied with streams, and by a universal system of irrigation the whole land is efficiently watered. In China the sewage of the cities and all available refuse is made use of as manure with the most profitable results; though to a foreigner residing in a Chinese town the method of removing the night-soil from the town by carrying it through the streets in great vessels supported on poles, and carried by porters like a sedan-chair, is surprising and not pleasant. There are four great tracts in which the soil is fertile, and the agriculture specially efficient:—(1) The maritime provinces S. of the Nan-ling, in which the climate and productions are tropical, and the land cultivated like a garden up to the slopes of the forest-clad mountains. (2) The N. and E. slopes of the Nan-ling, in which the tea-shrub and the camphor and varnish-tree (*Dryandra cordata*) are indigenous. (3) The great plain of the Yang-tse, with mild climate and its immense cotton and woollen culture, its vast paddy-fields and tracts of sugar-cane; and (4) The grain-farming land between the Hoang-ho and the mountains in the N.

Vegetable Productions and Animals.—The vegetable productions of China embrace all the fruits, vegetables, and grain grown in temperate as well as in tropical climes: in the tropical provinces of the S., mangoes, grapes, pine-apples, pomegranates, the lichi, the varieties of orange. The tea-shrub is universally cultivated in the warm and sheltered districts; and rice, the staple food of the Chinese, is raised in immense quantities both upon wet, or rather muddy fields, and on dry soils, where its cultivation is carried on like that of ordinary grain. In the N. maize, barley and wheat are extensively grown. Floriculture is universal. Waterlilies float on every sheet of still water. Artificial islands, constructed on the lakes, are all so many floating gardens; and the care with which the gardeners' azaleas, viburnums, and the host of brilliant flowers are carefully reared in the gardens and nurseries of China justify the application to that country of the name 'Flowery Land.' The tobacco plant and the poppy are also cultivated, and opium is an important article of manufacture. *Animals.*—The zoology of a country so densely peopled and so generally cultivated is not rich in the larger wild animals. The Bengal tiger, however, occurs in Yun-nan, and the bear infests the woods and rocky ravines of the mountains. Wild cats are common in the forests of the S., and are caught and fattened in cages for the table. Other animals, which do not usually come within the scope of the European *cuisine*, among them the rat and the puppy, are used as food. Muck and moose deer are found, and the buffalo is used to a limited extent in agriculture. Human labour, however, is so cheap in China, that beasts of burden are not so numerous as in most other countries. The sturgeon, sole, flat fish, rock-cod, and the golden carp are very abundant. Locusts visit the southern districts in numbers inconceivable. The air is at times darkened with their flight as with a thunder-cloud, and the ground is sometimes seen covered with these animals—which are from 3 to 5 inches long—two or three deep.

Industries and Arts.—The cultivation of rice, tea, cotton, hemp, sugar, and grain, and the manufacture of silk, opium, paper, porcelain, and lacquerware, are the principal industries. Curious carvings in ivory and mother-of-pearl are among the most interesting of the minor industrial products. The art-productions in drawing and painting betray an entire want of knowledge of perspective and of light and shade. The musical instruments of the Chinese embrace primitive and crude types of most of the European instruments, but no improvements have been made upon them for ages. The native music is shrill, harsh, and aimless to a European ear; yet many of the national songs are plaintive airs in the minor key, like the old national melodies of Scotland, Ireland, and Wales. The artistic genius of the country, however, is best displayed in its admirable pottery enamelled-work, engraving on wood and stone, its carvings and antique vessels in bronze, its filigree-work in gold and silver, and its fine lacquerware. The vigour of the inventive and artistic genius of the country in earlier ages, while intellectual life was a living and growing principle among the Chinese, and before the slavish and indiscriminate conservation which their religion inculcates had put a stop to progress, and unalterably stereotyped all ancient forms, however crude, as unsurpassed and unsurpassable, is attested by the fact that China anticipated Europe in many of the most important discoveries of modern times. It is certain that the art of printing was practised in China in the 10th c. Gunpowder was known and used (in the manufacture of fireworks) from a very remote period. The property of loadstone to communicate polarity to iron was understood during the 1st c. of our era, and a Chinese Encyclopædia of the date 121 A.D. describes loadstone as 'a stone with which direction can be given to the needle.' In a work written a hundred years later, the use of the compass is explained. To the Chinese also is due the discovery of the methods of manufacturing silk, paper, and porcelain, which they have carried to higher perfection than any nation in the world.

National Works, Monuments, &c.—The most renowned of the great national works of China is the Great Wall, which, from long. about 98° 30′, is carried eastwards over twenty degrees of long. along the N. frontier of China, over mountains and through valleys, and on bridges across rivers, to the Gulf of Leao-tong,—a distance of 1400 miles. It was built 200 years before the Christian era, as a protection against the inroads of nomadic Tartar tribes. Constructed mainly of earth and rubbish, it is bound in on each side by a coating of brick, and fortified at intervals by towers, which still in many instances have an imposing appearance. The Great Wall is from 15 to 30 feet high, rests on a basis of stone 2 feet thick, is 25 feet thick at the base, and from 15 to 20 feet at the top or platform. The towers are 40 feet square at the base, taper towards the top, and are about 37 feet high. The wall has long been entirely useless as a defence; it has consequently been neglected, and about one half of it has fallen to ruin, and is now little better than a shapeless mound of rubbish. The Grand or Imperial Canal extends from the town of Hang-chow (lat. 30°), in the province of Chi-kiang, N.W. through the maritime provinces of Kiang-su and Shan-tung to the town of Ling-ching (lat. 37°) on the river En-ho,—length about 700 miles. From Ling-ching the river En-ho is available as a continuation to Tien-tsin at its mouth. This great canal was constructed not merely to afford means of communication, but also to drain the plains that lie around the lower courses of the Yang-tse and Hoang-ho. With this view its breadth is unusually great. It is led across numerous rivers, including the two great rivers of China; and owing to the continual action and reaction of the waters of these streams, there are very few reaches of the canal which are without a distinctly noticeable current. At several points it is cut through rocks; it traverses lakes, and drains numerous swamps. The number of the flood-gates that regulate it, the bridges that span it, and of the cities and provinces between which it forms (with its many branches and the innumerable rivers with which it is connected) a vast, easy, and cheap system of communication, constitute it one of the greatest national works in the world. The part of the canal extending southward from the former bed of the Hoang-ho (q. v.) was constructed during the 7th, or early in the 8th c. The remainder, extending N. through Shan-tung and Chi-li, was the work of Kublai Khan (in the 13th c.) and his successors. Prior to 1853, when the lower course of the Hoang-ho was deflected from E.S.E. to N.E., the rice-fleet, bearing about 430,000 tons annually, passed northward by the canal from the southern part of the great plain of the Yan-tse to the neighbourhood of Pekin, and thus avoided the delay, and the liability to storms and the attacks of pirates, to which the sea-voyage along the winding coast exposed it. The deflection of the great river, however, and the consequent withdrawal of the water-supply from an important reach of the canal, have rendered it impassable for junks. Williamson, one of the latest travellers on the Grand Canal, describes its condition as he saw it in 1869. The 'summit-level' of the canal is at the junction with it of the

Ta-wan-ho (from the middle of Shan-tung province), about 30 miles S. of the point at which the canal enters the Hoang-ho. The greater part of the volume of the Ta-wan-ho runs S.E. through the canal, but a portion runs N.E., rendering the canal navigable for small boats to the Hoang-ho. From the Hoang-ho northward to Tien-tsin the canal is unnavigable, but from this town it is navigable to its practical termination,—the treaty-port of Tien-tsin. From the Pei-ho at Tien-tsin north-eastward to the river Pei-hang, a new branch of the canal, the object of which was to prevent the recurrence of the disastrous inundation of the plains of Tien-tsin in 1872, was completed in 1875. From Tsi-ning-chow, about 20 miles below the junction of the Ta-wan-ho, already named, the canal is navigable for good-sized junks at all seasons to Chin-kiang. Another great national work, the Mei-ling Pass, across the Nan-ling or southern mountain range, at the height of 8000 feet above sea-level, is a feat of labour and engineering which will compare with any of the Alpine passes. Across this pass nearly all the tea shipped at Canton, prior to the opening of the treaty-ports in the E. and N., was carried on the backs of porters, 200,000 of whom are said to have been engaged in its transport. After the opening of the treaty-ports, which were found to be nearer the great tea-districts than the port of Canton, the traffic over the Mei-ling Pass dwindled away. The empire is also traversed in all directions by great roads, usually from 70 to 80 feet broad in the plains, lined with trees, and carried across rivers by great bridges, which are often built of marble and adorned with innumerable fantastic figures of lions, tigers, dogs, and monkeys. Good cart-roads, also, connect all towns and villages of any importance. 'Few things,' says Williamson, 'impress the traveller more with the large-mindedness, ability, vigilance, and vigour of the former emperors, and the greatness of the empire, than these roads.' The monuments and gigantic idols and carved images of China are a special feature of the country. There are numberless statues in wood and clay of famous emperors and eminent men, mostly of colossal size and gilded. The statue of Confucius, which may be seen standing alone in all the numberless temples dedicated to the memory of the great sage, is never gilded, but is remarkable for its placid expression of features and sombre drapery. Before the tombs of the emperors of the Ming dynasty, in the neighbourhood of Pekin and Nankin, are ranged processions of gigantic figures, —men, horses, camels, elephants,—in stone.

Trade and Commerce.—The trade of China Proper, consisting of an interchange of commodities between its inland provinces and the Russian, Tartar, and Indo-Chinese states on its borders, is very active and extensive, but no official statement of its extent is available to foreign officials. Of the foreign trade or commerce of the country, however, the British consuls at the different ports are in a position to furnish annual returns. Of the ports of China, twenty-one have been thrown open to foreign commerce. Of these, eleven are primary or consular ports; but the consuls resident in them are also furnished with statistics of the chief, at least, of the secondary ports, and thus in the consular returns a fairly accurate statement of the whole of the foreign trade is given. Full statements of the whole trade of the Chinese ports are given under their names. (See CANTON, SHANGHAI, &c.) The whole of the foreign trade of China—with the exception of one-seventh, which is carried on with the United States and other foreign nations—consists of commerce with Great Britain and its Indian Empire, and with the British possession of the island of Hong-Kong (q. v.). The following is a statement of the trade of China (including Hong-Kong and Macao) in the years 1870-74 inclusive, with the quantities and values of the chief articles of import and export:—

TOTAL BRITISH IMPORTS FROM CHINA (INCLUDING HONG-KONG AND MACAO).

	Total Imports.	Tea.		Raw Silk.	
		Quantity.	Value.	Quantity.	Value.
	£	lbs.	£	lbs.	£
1870	9,905,716	125,593,898	8,787,894	578,441	681,277
1871	12,297,165	151,636,036	9,999,819	1,754,981	1,809,793
1872	14,395,248	160,520,882	10,879,038	2,096,329	2,147,746
1873	13,303,917	137,246,372	9,261,937	3,132,949	3,172,636
1874	11,938,194	133,452,693	9,110,669	2,656,764	1,996,203

TOTAL BRITISH EXPORTS TO CHINA (INCLUDING HONG-KONG AND MACAO).

	Total Exports.	Cotton Goods.		Woollen Goods.	
		Quantity.	Value.	Quantity.	Value.
	£	yds.	£	yds.	£
1870	9,547,563	396,975,526	6,183,016	19,130,018	1,183,700
1871	9,415,950	469,080,335	6,511,994	17,581,467	950,533
1872	9,497,184	402,077,775	6,373,049	18,565,519	1,178,567
1873	8,294,669	349,744,270	5,294,360	17,657,780	1,146,679
1874	8,402,066	393,316,000	5,304,659	13,872,770	871,542

From the above statement it appears that the Chinese trade with Britain during the years 1870–74 has been steady, with a slight tendency to decline in the last of the years named. This is accounted for partly from the circumstance that cotton, which is extensively grown in Chi-li and other provinces, chiefly in the N., became temporarily an export to Britain during a few years subsequent to the period of the cotton-famine in England. But the export of this article from the northern ports of China gradually and naturally declined as the wonted activity was resumed in the cotton-fields of America, and in 1874 it disappeared altogether. But this falling off in the export of cotton told doubly against British trade in 1874; for while in that year cotton was not exported to Britain, it was diverted to the southern Chinese ports, which being thus supplied with native cotton, were no longer under the necessity, as they had been previously, of purchasing that article from British India. The diversion of the cotton grown in the N. of China to the ports in the S. accounts for the fact that in Canton in 1874 there was a decrease in the export of foreign raw cotton of 161,256 piculs (the picul = 134 lbs.). Other causes for the decrease in our exports of textile fabrics to China are that China manufactures the cheaper kinds of goods more profitably than Manchester, and also that the import trade in these goods has, within the last few years, passed almost exclusively into the hands of guilds of native dealers at the different ports, who form commercial 'unions' for the purpose of excluding the foreigner. At Ning-po there was a decrease of 54,641 'pieces' of cotton goods, and of 9460 pieces of woollen goods, in 1874; and this decrease is due to the fact that here, as at other ports, the trade in cottons and woollens is passing bodily into the hands of Chinese dealers. The practices of the 'piece-goods guilds' of Ning-po may here be explained, as they are representative of the new commercial policy of the native officials at all the ports—a policy which threatens the very existence of foreign commercial enterprise among the 'Celestials.' The guild named pays to the Taotai (a local official, one of whose functions is the collection of customs-duties) two sums annually, one of 15,450,000 cash (equal to 14,500 dols.), and a further sum of 2000 taels (3 taels = £1), towards barrier expenses, in consideration of which they are allowed to impose a tax of from 12 to 50 cash (1d. to 5d.) per piece on piece-goods. This sum is imposed in addition to the half-duty duly paid to the Imperial Maritime Customs. A certificate, granted by the guild when the goods go into the interior, clears them of all further taxes. But this guild declines to have dealings of any kind with foreigners or their native agents. They refuse certificates to all goods of non-Chinese importers, and should such goods find their way into the interior, they are no sooner delivered to a purchaser than local officials, acting on instructions from the guild of the port, compel the purchaser to pay a tax on the goods of more than double the amount of the tax levied by the guild on goods bearing their own certificate. In default of payment of this tax, which is one of the various forms of the 'squeeze' upon the foreigner, which is a universal institution in China, the goods are seized. At Shanghai in 1874, the piece-goods trade was fairly prosperous; but even here, where European influence is distinctly felt, a powerful combination among the Chinese merchants enables them to 'bear' or 'bull' prices in a manner which is disastrous to foreign importers; while the same obstructiveness on the part of Chinese officials to the free transit of foreign goods in the interior hampers the operations of British importers in the same manner as at the other treaty ports.

Government.—The present Emperor of China, Tsai-tien, succeeded to the throne in 1875 on the death of Tong-che, who was nominated to the throne by his father, Hien-fung (died

22d August 1861). In the Chinese constitution (which is written in the Ta-tsing-whei-tien, or *Collected Regulations of the Great Pure Dynasty*), the Emperor, or Whang-ti, is supreme legislator, administrator, commander-in-chief, criminal judge, owner of the soil, and arch-priest. He is called Tien-tse, or Son of Heaven, and theoretically rules over Tien-hin, or all under the skies. The only qualifications of the prerogative are that the Whang-ti must govern according to the classics, and that he is disqualified by incapacity or wickedness, the people having a right to rebel in cases of 'prolonged famine, pestilence, or hordes of robbers.' They have no voice in the election of magistrates, the making of laws, the imposition of taxes. The Whang-ti is visited every morning by the Keun-ki-chu, or Cabinet Council, and on invitation by the Ne-kö, Inner Council, or Great Secretariat. The Li-fan-yuen, or Colonial Office, has charge of Mongolia and Thibet. It includes a Chamber of Compassion for 'fan,' or foreigners, a term which does not extend to outer barbarians, such as English. The Han-lin, Great College of Learned Men, literally Pencil Forest Hall, includes the various Ta-hyo-si, or ministers of state, who see that the constitution and the maxims of Confucius are obeyed, and who collectively control the six Boards of Offices, Revenue, Ceremonies, Military Affairs, Punishment, and Works. This last includes the Chambers of Architecture, Government Stores, Hydraulics, and Mausoleums. The Han-lin is properly a senate to test literary attainments, on which office depends. The Board of Ceremonies is subdivided into the Chamber of Etiquette (which regulates marriage, funerals, public rejoicings, &c.), the Chamber for Regulating Sacrifices, the Chamber for Mutual Intercourse (which provides a reception for illustrious strangers), a Chamber for Arranging Festivities or Imperial Banquets, and the Board of Music. Quite apart from the executive, but represented at the meetings of all the boards, and having a general power of direct remonstrance or petition to the throne, is the Tu-chah-yuen, or Board of Censors, whose business is to watch the proceedings of mandarins. In each province is a Swuin-fu, or governor, who has the sole power of addressing the throne or council, has the power of life and death, and is the military commander. His office is generally forfeited by the occurrence of a rebellion. Beneath him in each province are the Pie-chung-si, or superintendent of provincial taxes, which he receives from the magistrates and accounts for to the governor; the Ngan-cha-si, or provincial criminal judge, who receives and reports on persons sentenced by the district magistrates to death or banishment; and the Hioh-tai, or educational examiner, who corresponds with the Han-lin, and conducts along with the prefect the primary examinations for the literary degree in the departmental cities. Several departments, grouped together within a province, are placed under a Tau-tai, or intendant of circuit, who has charge of the customs, corresponds with foreign consuls, and hears appeals from the court of the prefect. One species of Tau-tai, the Ping-pae-tau, has a military command, and draws money from the treasury for troops which have often no real existence; another, the Yeu-yun-tau, is sometimes called the salt commissioner. The single department, or 'fu,' is presided over by a Chi-fu, who hears appeals from the lower courts. The 'fu' is divided into several 'liens,' about the size of English counties, in which the Chi-lien or chief mandarin is the sheriff, police superintendent, coroner, receiver of taxes, and literary examiner. Under him are the assistant district-magistrate, inspectors, masters of prisons, writers, tax-gatherers, constables, &c. It may be useful in connection with these names to add the meanings of some terminations constantly used in Chinese :—*Shau*, a hill; *Chung* or *Cheng*, a city; *Chwang*, a large village; *Tsun* or *Tun*, a village; *Kwan*, a fortified pass; *Mun* or *Men*, a gate; *Kow*, a port; *Kiai*, a market street; *Ho*, a river or canal; *Kiang*, a great river; *Hu*, a lake; *Yamun*, a mandarin's office; *Wang*, a prince. Little is accurately known as to the public revenue of China, which has been stated at £100,000,000. It would be unsafe to infer anything from the amount of the customs-duties, which in 1873 amounted to 10,977,082 taels or £3,659,027, of which imports contributed £1,268,285, and exports £2,045,706. The other sources of revenue are a land-tax and trade licences, which are probably made to bear the heavy deficits frequently occurring. In 1874 China for the first time contracted foreign debt, viz., £627,675, issued at 95, bearing 8 per cent., and secured on the customs-duties. It may be explained that the Chinese tael = 10 mace = 100 caudareens = 1000 cash = 6s. 8d. sterling. It is part of the duty of the mandarins to read periodically to the people from the *Book of Sacred Instructions*. Besides this, the penal laws are printed and circulated among the people (nearly all of whom can read and write), so that no one may plead ignorance of the law for which he is punished. There is in criminal justice a vicarious principle; parents being occasionally punished for the crimes of children, and districts for those of individuals. The Government reserve a power of punishing cases of 'improper conduct' not defined in the penal code. The enormous patronage of the court and the extensive system of espionage contribute to the stability of the empire. See Archdeacon Gray's *History of C.* (2 vols. Lond. 1878).

Religion.—Like the Babylonians, the ancient Chinese erected large square altars and high terraces of earth, stone, and brick. The sacred altars in Peking, on which imperial sacrifices are offered every winter solstice to Shan-ti, are square earthen terraces about 60 yards in circuit, and from 4 to 6 feet in height. There was before Confucius a singular numerical philosophy, which is said to have been received by Ta-yu, B.C. 2200, as a reward for his success in subduing the inundations of the rivers. It contains nine categories—(1) Five elemental energies; (2) five human actions; (3) eight departments of government; (4) five registers of time; (5) the Emperor's perfection in virtue, or himself attaining the summit of virtue; (6) the three virtues; (7) investigation of doubts by the tortoise and diviner's grass; (8) five natural indications; (9) five kinds of happiness and six of misery. This numerical scheme is also seen in the Pa-kwa, or eight diagrams of Fo-hi, a system of whole and broken strokes arranged octangularly, the basis of the 'Book of Changes,' and used on the Chinese mariner's compass. The number eight curiously survives in the number of meats allowed at the imperial dinner, which are bears' paws, deers' tail, ducks' tongues, torpedoes' roe, camels' hump, monkeys' lips, carps' tails, and beef-marrow. Combinations of the five primitive elements are constantly used as the basis of calculation in fortune-telling with the joss-stick, which is largely practised according to printed rules and for fixed charges, chiefly by unsuccessful candidates at the public examinations. This gambling spirit appears everywhere. Tradespeople have bamboo-tubes full of sticks, with numbers burnt into the concealed end, from which the customer draws his price; some even use dice. In the temples, two plane-convex bits of bamboo are tossed by the worshipper, and the omen is good or bad according as they fall. It is in his commentaries on the *Ye-king*, the Book of Changes, that the famous Chu-tsze explains the principle of Tae-keih, represented by a circle, on one semi-diameter of which a semicircle is described, and on the other semi-diameter, but in the lower half of the great circle, another semicircle is described. The curved divisions thus obtained represent the *yang* and *yin*, the masculine and feminine, the celestial and terrestrial, the sun and moon. This materialistic theory, resembling the Egyptian fable of the mundane egg and the Brahmanic legends of creation, was applied vigorously to all nature, the whole vegetable and inorganic world being endowed with sex, and numbers themselves having a gender.

There are many minor religions in China, such as Mohammedanism, which is diminishing, but still extensively spread; the Vegetarians of Ningpo, who profess the 'Religion of the White Lily' and the 'No-Hypocrisy Religion,' and distinguish themselves by holding the breath until the face becomes livid and the body stiff; the simple creed of the Pepohoans of Formosa, that the world has existed and will exist for ever, together with its present occupants, who are punished in their next stage of existence for their misdeeds in the present; then the Feng-shui, or Wind-water, *i.e.*, Incomprehensible system, which determines the proper sites of tombs, houses, or cities from the configuration of rivers, trees, and hills. This singular superstition assumes that all evil comes from the S., and that evil travels in straight lines. Hence curved lines are introduced as much as possible; a pagoda or a heap of stones will divert the lines, and protect a considerable district from famine and plague, and most of the temple doors have wooden screens inside, which intercept the evil spirits from proceeding to the altar. Perhaps the strongest among the practical religious feelings of the Chinese is that of predestination. It is well illustrated in a popular almanac of the present day, in which a woodcut represents a fly, a spider, a bird, a sportsman, and a tiger. Each of these animals successively kills his prey, and then they all fall into a well. So also

in the great cities it is the custom, if a coolie laden with wine or oil slip and fall when the streets are slippery with ice or snow, that he shall be held liable for the damage done; if on a fine day, when the streets are dry, the owner of the goods bears the loss, for, like the burning of the icehouse, this unlikely accident is taken to be clearly the will of Heaven. All this is mixed up with the grossest superstitions. Even the intelligent and liberal viceroy, Li-hung-chang, who lately established the Nanking arsenal under Dr Macartney, armed the Peiho forts with Krupp guns, and introduced foreign drill to the army, expected that by self-prostration before a small water-snake he might persuade the god of floods to stop those in Chihli. The chief faith of China has for the last ten centuries undoubtedly been Confucianism, which is not a religion in the sense of having any account of the invisible world, but is a system of self-culture with two great objects—the proper government of one's own family and of the state. It exhorts men to love virtue for itself, without hope of reward or fear of punishment, and it is extremely obnoxious to the Christian missionaries, as laying down the principle that 'man's nature is originally good.' It resembles Christianity, on the other hand, in the importance it attaches in theory to purity of secret thoughts. Practically, however, what distinguishes Confucianism is the sanctity it throws round the existing social relations of dependence and subordination, both public and private. It establishes a power of life and death in the head of the family (*Penal Code*, s. 293), and a despotism (assumed to be benevolent) in the head of the state. The conservative method of Confucius is revealed in the *Li-king*, or Book of Rites, which contains 3000 ceremonial usages, and is administered by one of the public departments. Confucius said: 'I do not know life: how can I understand death?' Hence the state-worship by sacrifices, before referred to, is strictly positivist. The Jesuits, who at first got on very well with the Confucians, said that this worship (which includes the burning of a bullock in a large furnace of green-glazed bricks, with the professed object 'of attracting the attention of the Heavenly Spirit') really related to an intelligent moral creator, Tien or Shan-ti; to a primitive monotheism which existed before the worship of the saints (Shing-jin), of the lofty good and evil spirits (Shen and Kwei), before the Sabean worship of the heavenly bodies, or the worship of ancestors by means of tablets. It is true that the Emperor Kang-hi assured the Pope that his worship was not addressed to the visible system of things; but after allowing much for the fetichism of the uneducated masses (who are singularly isolated from the literary and governing class), it remains true that Chinese religion, in so far as consciously Confucian, is not, indeed, atheistic but agnostic. Buddhism, the creed of the Tartar dynasty, began to appear in China about 217 B.C.; and in 120 B.C. a Chinese general, after defeating the barbarians to the N. of Gobi, brought back a golden statue of Buddha as a trophy. In A.D. 65 it was officially recognised by the Emperor Ming-ti as a third state religion. Soon after, the life of Buddha, *Lalita Vistara*, was translated into Chinese under imperial auspices, and three centuries after this began the great stream of Chinese Buddhist pilgrims—Fahian (A.D. 390), Hœi-seng, Song-yun (A.D. 518), Hiouen-thsang (A.D. 648), Khi-nie (A.D. 964), whose travels, along with the *Itineraries* of the fifty-six monks (A.D. 730), are all extant, and some of them translated into European languages. The story of Hiouen-thsang, translated by Stanislas Julien, is a graphic romance and an invaluable history. He returned in honour to China with a great number of Sanskrit works on Buddhism, which he afterwards translated in 1335 volumes. There are now in the Peking temple wooden blocks for printing upwards of 6000 Buddhist volumes. In Chinese, Brahma became Fan-lon-mo, and Buddha became Fo-to, which was vulgarly shortened to Fo. Buddhism is a creed of ideal purity; its Pentalogue enjoins not only moral duties, but abstinence from marriage and wine. But even these fundamental precepts are disregarded by the mendicant priests of China, whom the best authority has called 'a lying, shameless, debauched class.' They extort money from the poor not merely by begging on false pretences, but by impostures in the temples. Thus, at the shrine of Kuan-yin, goddess of mercy, at Hong-Kong, the goddess prescribes certain drugs, which are sold by an apothecary who has an understanding with the priests; and the priests themselves sell worthless bits of paper as counterfeits for money, which are then burned at the altar—a proof of the Chinese reverence for the 'written word' in whatever form it may appear; even a pawnticket or a newspaper is regarded as something sacred. The centre of Buddhism is the island of Put in the Chusan Archipelago, where since A.D. 550 there have been sixty temples governed by an abbot or Tae-hoshang. These are supported by the rent of Church lands, the contributions of pilgrims, and the labour of the priests. Here and there are monasteries of devout and clean men. The great Hall of Saints, Lo Han T'ang, contains 500 gilded images of Buddhist saints, one of whom is supposed to be that good Catholic, Marco Polo, the traveller. The Buddhist pagodas are circular towers, 200 feet in height, containing seven stories, reached by a spiral staircase, each floor having an outside terrace, surrounded by a massive stone balustrading resting on ornamental brackets. They are chiefly found in S. China, and are not known outside China. They were probably built as beacons and watch-towers, and as places of strength in which to guard the relics of Gautama. The tonsure, celibacy, fasting, prayers for the dead at fixed money rates, the baptism in water, the rosaries and chaplets, and the Franciscan dress of the Shamans or Buddhist priests, suggested to Père Gerbillon that they must have been subject to Christian influences from Syria and Armenia. The third great faith is Taouism, which was first taught by Taou or Laou-tsze, a contemporary of Confucius, in the 6th c. B.C. He taught contempt of worldly riches and honour, and thought true happiness was to be found in starving all troublesome wants and living apart in slothful tranquillity. His followers believed that life might be indefinitely prolonged by an elixir, and therefore became alchemists. The mysteries of the Taouist, 'Three Pure Ones,' were announced to man through the 'great barefooted angel,' and are written in the Scripture, Taou-te-king, a copy of which is possessed by the Royal Society. Under the Sŭng and Tang dynasties this sect became very influential, the title of Tien-sze, or celestial teachers, being given to its professors. Three Taouists, named Chang, excited the rebellion of Yellow-Caps, which put an end to the Han dynasty. But the religion is now represented chiefly by professional jugglers, who traffic in all the grossest superstitions of the people. To the Confucian student the theoretical asceticism of the Buddhist and indifference of the Taouist are both equally culpable; but practically there is very little bigotry shown between the members of the different persuasions. The three faiths agree, however, in detesting Christianity. This is shown in a poem published in 1874 in the tea-market at Hankow, which, after sarcastically referring to the 'stillness and cleanliness' of Buddhism, and the 'abstruseness and hollow mockery' of Taouism, attacks the gospel *with its secret confusion of sexes*. This spirit is partly political or patriotic, but the spiritual and moral difficulties in the way of the missionaries are enormous. Thus, the Chinese work seven days in the week; there is no restriction on the sale of spirituous liquors, and no drunkenness except from opium; there is no charity, except in the customary support of parents and other relatives and friends; and the result is, that nearly everybody works, although wages are barely sufficient for comfortable subsistence. Accordingly the social evils to be attacked in China are different from those most prominent at home. It is not true that the Chinese are specially prone to thieving, but they lie systematically; and suicide, especially among women, is very common, and is in many cases applauded. They have been unjustly accused of unusual cruelty, especially in judicial punishment. 'The lingering death,' described by Meadows, is quite obsolete; the heavy bamboo is also abolished; and the light flogging, and the *kea* or Cangue (q. v.), or wooden collar, are imposed under rules which would gratify Beccaria himself. A more serious matter is that thefts and sometimes homicides are compromised by money payments in court. See Edkin's *Religion in China* (2d ed. Lond. 1878).

History.—The fabulous part of Chinese history begins with the Three Emperors, Fo-hi, who invented numbers, music, &c.; Shin-nung, the divine husbandman; and Hoang-ti, who divided the land into groups of nine equal squares, of which the centre was owned by the state, and who introduced the cycle of sixty years. Then follow the Five Sovereigns, of whom Shun is connected with the tradition of the Deluge (the overflowing of the Yellow River), and also the first choice by a reigning emperor of his successor, which is still the rule. After two periods, named *Hea* and *Shang*, a martial king, Wu-wong, about 1100 B.C., revolts and founds the dynasty of Chow, which endured till 240 B.C. It was about the middle of Chow that a partial consolidation of the independent states or dukedoms in Northern China took place.

The first true Emperor, Chi-hoang-ti, built the Great Wall, and burned nearly the whole of the classic literature. During the Han period (B.C. 200–A.D. 200), the Tartar becomes troublesome on the N.W. frontier. After an interval of Sankuo, or 'Three States,' the Duke of Wei established the supremacy of the Tsin dynasty on the Salic principle (afterwards disregarded), that 'queens should not reign, nor assist in public matters.' From A.D. 416–585 the cities Nanking and Hünnan appear as the capitals of separate kingdoms, which are afterwards united, and the dynasty of Tang (A.D. 622–897) appears with the wise and just Tae-tsung, whose virtues are soon forgotten in the wicked tyranny of the eunuchs. A chaos of half a century, called the How-woo-tae, or 'Latter Five Successions,' follows, in which Davis thinks he sees the features of a feudal land system surviving in the tax of 10 per cent., to which the Emperor is still entitled out of all lands. To this period belong the accounts of the early Arabian travellers, who describe the taxes on salt and tea, the use of the bamboo, and the excessive issue of paper money. Under the feeble and vacillating Sûng dynasty (A.D. 950–1281) a great impetus was given to the production and multiplication by printing of books, and the manufacture of porcelain was begun at King-teh-chin; but the attitude of the Eastern Tartars grew constantly more threatening, until China had to call for help to the Mongol chief Peyen (Hundred-eyes), with the usual result of introducing a foreign dynasty, that of Yuen, whose first monarch was Kublai Khan. He, a Buddhist, tried to suppress Taouism, surrounded Peking with the Grand Canal, and founded the medical college, where the doctrine of the pulse, the diseases of children, and the therapeutics of counter-irritation have ever since been expounded. The narrative of Marco Polo belongs to this time, which is also marked by the establishment of Mohammedanism as the religion of a considerable part of the people. The Mongols rapidly degenerated, and in 1366 Hung-wu, a Chinese bonze, founded the Ming dynasty, and removed the capital to Nanking. Under this line, which enriched the world with many magnificent metal vases and tripods, gave Macao to the Portuguese, and saw the first of the Jesuit missions (Fathers Ruggino and Ricci, worthily followed by Fathers Schaal and Verbiest), a war gradually sprang up between China and the Bogdoi Khans or Manchu princes; and in 1644, after promising freedom from taxation, Tien-ming (or Heaven's Decree) founded at Peking the Manchu Tartar dynasty, which still rules. To them belong the present uncouth pigtail and costume of China. Their empire was not assured until the long and brilliant reign of Kang-hi, who had friendly negotiations with the Pope and with Peter the Great, and who inflicted a decisive defeat upon the Kalmucks. In 1662 he expelled the Dutch from Formosa, and in 1692 he published a decree permitting the exercise of Christianity, which was forfeited by a foolish claim of jurisdiction on the part of the Pope. The Supreme Emperor, Kien-lung (1735–95), received in 1793 Lord Macartney, the first British ambassador to China, who was followed by Lord Amherst in 1816. Kien-lung (who persuaded the banished tribe of Tourgouths to return from Russian rule in 1772) deserves the highest credit for relieving the East India Company (established with a concession of the right to trade at Canton since 1637) from some of the grievous customs and port duties; but Macartney failed in opening the ports of Ningpo and Tientsin. Amherst's mission, intended as a protest against the avowed Chinese policy of 'treating the barbarians as beasts and not as citizens,' was equally unsuccessful. Taou-kuang, 'the Glory of Reason' (1820–50), murdered the Mohammedan Tartar Prince Jehanghir, and made a successful campaign on the Cashgar frontier. In 1834 the charter of the East India Company, which had hitherto regulated trade at Canton, came to an end, and Lord Napier went out as commissioner. The Chinese wished to have a *taepan*, or commercial superintendent without representative character, in order to assist them in dealing with the illicit trade in opium, which had now begun, and against which the Chinese commissioner Lin distinguished himself by his energy and duplicity. This question led to the war of 1840, in which Amoy, Ningpo, and Shanghai were taken, and after which, in 1842, the Treaty of Nanking was signed, abolishing the Hong monopoly, opening five ports with a moderate tariff, and ceding the island of Hong-Kong. Another military expedition was rendered necessary by outrages committed in 1847. But the Chinese Government was now seriously shaken by the great Tae-ping rebellion, led by Hung Sew Tseuen, a peasant of the Canton district, against Hien-fung, the Manchu Emperor who succeeded in 1850. Hung was at first mistaken for a Christian: he was in reality an immoral impostor who arrogated divine honours to himself. His political object was to restore the Ming dynasty, and therefore he established himself at Nanking, the ancient Ming capital. The course of this great insurrection has been traced by Mr Meadows and Commander Brine; and its inner spirit will best be seen in the autobiography of Hung or Chung-wang, the Heavenly Chief, published at Shanghai in 1865. The Taeping publications were translated by Medhurst in the *North China Herald*. Meantime, in spite of the prudent action of Sir J. Bowring, Governor of Hong-Kong, the treatment of the English merchants at the ports, especially by Commissioner Yeh, became again intolerable. At last (1856) the *Arrow*, a small British colonial vessel, was violently seized. This led to the first mission of Lord Elgin, described by Mr Oliphant, and the expedition of the allied French and English forces, which resulted in the important commercial Treaty of Tientsin (26th June 1858), fixing the right of British subjects to travel with passports, throwing open five additional ports, and adjusting a general rate of transit dues. The treaty was not carried out, and this made necessary Lord Elgin's second mission of 1860, described by Mr Loch. There was more fighting, which began with the repulse of Admiral Hope at the Taku forts, but was afterwards better managed by Sir Hope Grant. The palace of Yuen-ming-yuen was burned to the ground as an appropriate punishment of the treachery of certain mandarins. After this, British officers served in suppressing the Taeping rebellion (which lasted till 1864), and British civilians held important posts in the departments. After the failure of the expeditions of Major Gordon and Major Sherard Osborn, and the massacre of 30,000 rebels at Foo-chow, the Palmerstonian policy of permitting British subjects to serve in China was abandoned. In 1873 the Chinese brought to a successful close a war which had lasted for seventeen years with the Panthays, a Mohammedan race in the district of Yünnan. At last Talifu, the capital of the Sultan Soleiman, and Momien, were taken with great slaughter by an army of 200,000 under Li-ssa-ta-ye, the general who nearly destroyed Major Sladen's exploring party from Burmah in 1868. In June 1873 the young Emperor Tsai-shun gave the first public reception to the ministers of the Great Powers. (This Emperor, who died 12th January 1875, was known as Tong-che, in accordance with the singular custom that the true imperial name, being sacred, may not be profaned by use.) In 1874 the murder of fifty Japanese sailors led to the expedition under General Saigo to the island of Formosa. The result was a treaty on 31st October 1874, acknowledging China's sovereign rights in Formosa, but giving to Japan a sum of 500,000 taels, partly in compensation to the families of the murdered sailors, and partly in payment for roads and buildings constructed by the Japanese. In January 1875 the foulest of all Chinese murders was perpetrated on Mr Margary, of the consular service, at Manwyne. Margary belonged to the party of Colonel Browne and Dr Anderson, sent out by Lord Salisbury to discover a through trade route from Burmah by the entrepôt Bhamo to Yünnan. Sir T. Wade, British Minister at Pekin, by threatening to break off diplomatic relations, got the Emperor to send Li-han-chang as a commissioner to investigate the matter. The English Government had already sent Messrs Grosvenor, Davenport, and Baker for the same purpose. Sir T. Wade has also taken this opportunity of securing a general inquiry into the taxation of foreign trade; an edict enjoining that all foreigners with passports are to be unmolested, or, if wrong-doers, to be given over to the consulate; an undertaking that all foreign treaties shall be published in the *Peking Gazette*, the proper rank being given to the foreign ministers, and that there shall be regular intercourse between the foreign legations, and not merely the Tsung-li-yamen, a commission of cabinet ministers organised in 1859, but all the departments as well. In these negotiations, however, Prince Kung has distinctly laid down the principle that his Government 'have never sanctioned trade carried on within the limits of a subject state.' This principle is not acted on on the Mongolian borders or in Turkestan, where facilities for inland trade have been given to Russia. Britain is entitled to similar facilities on the frontiers of Thibet, Nepaul, and Burmah. But until the *lekin* and other provincial sur-taxes—levied with great official corruption—on inland trade are abolished, or transferred to the transit duty collected at the consular ports, mere freedom of

passage will remain of little value. The new Semipalatinsk route to the Kiayu Pass, and the impending fall of Yacoob Beg, the Mohammedan ruler of Yarkand, will give great commercial advantages to Russia. The present Emperor is Tsai-tien. See section on *Government*.

Language and Literature.—In Chinese no word is allowed more than one consonant and one vowel—the vowels including diphthongs and nasal vowels. The possible number of words is therefore very small, and it is said there are only 450 significative sounds. But each word is made to vary its meaning according to accent and intonation; so that the total number of words in this sense is 43,496. This being the structure of the spoken sounds, a graphic representation of sounds was impossible, and therefore hieroglyphical writing, enlarged by the introduction of determinative signs, was used. Twenty-nine thirtieths of the language consist of combined signs, one part indicating the general sound, the other indicating the special meaning. Hence the omission of a stroke or a dot entirely alters the idea. But these signs only supply the idea; the number, gender, case, person, tense, mood, any special determination or qualification of the idea, must be expressed by an additional word. Inflection is unknown, and the syntactical relations of the words in a sentence are therefore expressed by position. The earliest Chinese alphabet consisted in the use of a knotted cord; then came Fu-hi's octangular figures; then the 'tadpole' character, consisting of waving lines and blotted heads, seen in old inscriptions, and supposed to survive in the 608 simple hieroglyphic signs for the more familiar natural objects; then the 'seal' character, still used in titles of books, inscriptions, &c. The Li and Kiai characters, now generally used, are not older than the beginning of the Christian era; and the more stiff and modern Sung character is also sometimes used in printing, the wooden types being cut out from the copy pasted on to the block. Some abstract ideas are expressed by the combination of hieroglyphs; and by processes resembling those of metonymy and synechdoche in poetry, the meaning of one hieroglyph is gradually extended by association. But from the constant use of abbreviations, and of the 'grass hand,' to which fancy lends some ornament, the old hieroglyphs themselves need interpretation. The paper used is made of the second skin of the bark of bamboo, soaked in water with lime till the woody parts are separated from the pulp. The rice-straw paper is not largely used. As in Japan, brushes, not pens or pencils, are used. Writing and printing are in perpendicular columns. While the book language remains the same, there are 200 or 300 spoken dialects, which are often unintelligible beyond their native province. The *Kwan-hwa* or Mandarin dialect is, however, used by two-thirds of the Chinese. The Canton and Amoy dialects occupy towards Mandarin the position of Latin towards French. On the Amur, and in the military garrisons all over China, in Pekin for the formal ceremonies of court, and also generally for documentary purposes, use is made of the Manchu language, the alphabet of which, representing one thousand syllables, is said to have come from the Syriac through the Nestorian communities of W. Asia, who gave it to the Mongols. Chinese largely enters into Japanese, and one-fifth of Mongol words are Chinese. The language undoubtedly presents great difficulties to strangers, not merely from the novelty of some combinations, but also from the distinction of even and inflected tones, the latter consisting of the 'rising, departing, and entering tones.' The tones are further subdivided by reference to the heavy or light initial of the syllable. There is in Chinese a great deal of what we should call slang. Thus, 'how are your venerable teeth,' is the expression for 'how old are you?' There are also many singular euphemisms: 'The guitar string is broken' means 'his wife is dead.' The Emperor never dies, he 'becomes a guest on high.' Affection for a child is expressed by the endearment of '1000 ounces of silver.' There are also many excellent proverbs in the collection called *Ming-sin-paou-kien*, and elsewhere. The most cynical is: 'There are two good men, the one dead, the other not yet born.' The singular jargon of Pidgin-English or sing-song has been made the subject of a book by Mr C. G. Leland (1876). Besides the Five King and the Four Shu (described in the article CONFUCIUS), and their numerous annotations, there is an immense mass of Chinese literature, much of it of no value. In Wylie's *Notes on Chinese Literature*, five pages are devoted to the enumeration of thirty well-known and voluminous catalogues of ancient and modern works. An acute observer (Mr H. A. Giles, in *Chinese Sketches*, 1876) says: 'More works on topography have been written in Chinese than in probably any other language, but to say that even these are read is quite another matter.' Hence from the existence of the *Ta-tsing Ye-tung-chi*, or Complete Account of the Ta-tsing Empire, in 240 volumes, and from the existence of separate statistical histories in all the provinces, we must not infer that the Chinese know much about their own country: they are on principle ignorant of all other countries. The educational books on such subjects as zoology, ethnology, botany, &c., are full of childish nonsense. The missionaries, from Father Ricci (who translated *Euclid's Elements* into Chinese) to Mr Wylie, have given the Chinese opportunities of progress in mathematics and astronomy; but although there is at present at the imperial college a distinguished mathematician, Le-sheu-lau, the author of *Tae-su-hea*, or Treatise on Algebra, nothing of importance seems to have been done. Similarly, while the medical missionaries, such as Lockhart, Dudgeon, and Maxwell, have done much to extend medical knowledge, and there is now an English Professor of Anatomy (as of other subjects) at Peking, it is doubtful whether the Chinese have advanced far since Kublai Khan founded his Medical College. A strong prejudice exists against Christian works. The continuity of Chinese historical literature was broken by the burning of books, commanded about 200 B.C. by the first Tien Emperor; but this has not prevented a large manufacture of native histories from the beginning down to the close of the Ming dynasty in 1643 A.D. Of this, the only interesting portion is the *Sai-kuo-chn*, or History of the Three States. The history of the Manchu Tartar line, named *Tong-hua-lo*, is not yet published. Among biographies, the taste for which was set by the *Yun-lu*, or Discourses of Confucius, may be mentioned the *Sing-pu*, in 120 volumes. The dramatic literature is large, and is well represented by the *Heir in Old Age*, translated by Davis from the Collection of One Hundred Plays; and in the *Chalk Circle*, translated by Julien. Several specimens of the Chinese novel have also been translated: *The Two Cousins*, by Rémusat; *The Lasting Resentment of Miss Keaou Lwau Wang*, by Thom; *The Fortunate Union*; and *The Two Young Bluestockings*, by Julien. The earliest monument of Chinese poetry is the *Shi-King*, the First Canonical Work, or Book of Sacred Songs. It describes the manners of different states and the great deeds of heroes and sages, and also contains hymns for state ceremonies. Much of this is in lines of four words, the monotony of the prevailing monosyllable being varied by its occasional repetition, so as to produce a foot. Rhymed quatrains and a cæsural pause are also used, and much of the poetry is marked by a parallelism or antithetical balance of expression. The golden age of Chinese poetry was in the 8th Christian century.

Chi'nese Green Indigo, or *Lo-Kao* of the Chinese, a green dye now much used in Europe, prepared from two species of buckthorn, viz., *Rhamnus chlorophorus* (*globosus*) and *Rhamnus utilis*.

Chi'nese Hemp. See CORCHORUS.

Chi'nese Ink. See INDIAN INK.

Chi'nese or **Chi'na Sea**, an inlet of the Pacific Ocean, enclosed on the N. by the mainland of China and Formosa, S. by Borneo, W. by Further India, and E. by the Philippines. It contains the Gulfs of Siam and Tonquin, is some 2100 miles long from the island of Formosa to Singapore, and has a maximum breadth of 900 miles.

Chi'nese Tall'ow, a white sebaceous substance covering the seeds of *Stillingia sebifera* (natural order *Euphorbiaceæ*), made into candles, &c. It is now acclimatised in Algeria.

Chi'nese Wax, a substance produced by an insect (*Coccus Pe-la*) which feeds on the Chinese ash (*Fraxinus chinensis*).

Chingleput (*Chengalpatu*, 'the brick town'), the chief town of the district of the same name, Madras, British India, 36 miles S.W. of Madras by rail. It is meanly built, but has a fortress and a large tank, which in the dry season gives off malaria. C. is in general, however, a healthy place. Pop. (1871) 7979. The French took the place in 1751, and retained it till the following year, when it was captured by Clive.—The *district* of C., which lies on the Bay of Bengal, and is poor in soil, has an area of 2619 sq. miles, and a pop. (1872) of 940,747.

Chini', a village of the Punjab, in the Himalayas, on the right bank of the Sutlej, about 80 miles N.W. of Simla, at an elevation of 8770 feet above the level of the sea. The climate is pleasant and salubrious, and eighteen varieties of the grape are said to be cultivated successfully in the district.

Chin-Kiang-Fu ('River-Guard City'), a city of China, on the Yang-tse, where it is joined by the Grand Canal, 150 miles from the sea. It was a great commercial centre till about 1853, when the Grand Canal was partly destroyed by the Tae-ping rebels, in consequence of which it has lost its importance. The pop. is said to have dwindled from 500,000 to some 500. The port was opened to foreign trade in 1858 by the Tien-tsin treaty, and in 1864 the English formed a settlement here.

Chi'non (the *Castrum Caino* of the middle ages), a town in the department of Indre-et-Loire, France, on the right bank of the Vienne, 26 miles W.S.W. of Tours. It was once fortified. From the tower, in which Jacques Molay, the last grand-master of the Knights Templars, was imprisoned, a fine view of the neighbouring country is obtained. C. has manufactures of druggets, serges, earthenware, and saltpetre, and a trade in grain, wine, brandy, honey, and prunes. In the Castle of C. Jeanne d'Arc was first presented to Charles VII. C. is also the birthplace of Rabelais. Pop. (1872) 4625.

Chin'quapin, a name applied in the Eastern States of N. America to *Quercus prinoides*, as well as to *Castanea pumila*, and in the N. Pacific region to *Castanopsis chrysophylla* of California and Oregon.

Chinsu'ra, a town on the right bank of the Hoogly, 20 miles N. of Calcutta. It is built in the Dutch style, having been a Dutch settlement till 1824, when it was ceded to Britain in exchange for possessions in Sumatra. The Hoogly College is situated here. C. is famed for its cheroots. Separate pop. about 14,000; along with Hooghly (1872) 34,761.

Chintz (Hind. *chhint*, 'spotted cotton cloth;' *chhintâ*, 'spot,' *chhintna*, 'to sprinkle'), a highly-glazed cotton fabric, the ground of which is usually light, while the pattern, brought out in flowers, foliage, birds, &c., often in four or five gaudy colours, has a spotty appearance. Owing to the glazed facing of the cloth, dust does not readily adhere to it, and therefore it is much used for bed-hangings, furniture coverings, &c.

Chiococc'a, a genus of plants of the natural order *Cinchonaceæ*, chiefly belonging to the tropical and sub-tropical regions, and consisting of small shrubs. The roots of all of them are violently emetic and cathartic, and in Brazil are used as remedies for snake-bites, though, according to Martius, it is a doubtful remedy, owing to the action of the drug being almost as dangerous as the snake-poison itself. The species chiefly used are *C. anguifuga* and *C. densifolia*. At one time it was used in Europe as a diuretic and purgative, but owing to its violent action precluding its use unless in extreme cases, it is now rarely seen in legitimate medical practice.

Chioggia, or **Chiozza**, a seaport, N. Italy, province of Venice, 15 miles S.S.W. of Venice, built on piles on an island of the same name, and connected with the isthmus of Brondolo by a bridge of forty-three arches. The harbour is protected by two forts. C. has manufactures of cordage and lace, some ship-building establishments, a good coasting trade, and an active fishery. Pop. 26,732.

Chio'nis and **Chio'nidæ**. See SHEATH-BILL.

Chi'os, Chi'o. See SCIO.

Chip Hats. See BRAZILIAN GRASS.

Chipp'enham (Old Eng. *Cyppenhamme*, a 'market-place'), is a parliamentary and municipal borough, Wiltshire, on the left bank of the Bristol Avon, here crossed by a handsome old stone bridge of twenty-one arches, and a station on the Great Western line, 13 miles N.E. of Bath. It has some silk and woollen manufactures; tanning and malting are carried on extensively, and there is a large flourmill. C. has a monthly market for cattle, and its cheese-market is one of the most important in the empire. Its parish church was restored (1878) at a cost of £6000. It returns one member to Parliament. Pop. (1871) of the municipal borough, 1387. C. is the place where the Danish army wintered in 878, when Alfred was in hiding in Athelney.

Chipp'eways. See INDIANS, AMERICAN.

Chiq'uichiqui Palm (*Attaleafunifera*), a palm of the N. of Brazil, which yields the Piassaba Fibre (q. v.). It is an inhabitant of swampy or flooded lands on the banks of the Rio Negro and other Venezuelan and Brazilian rivers. The leaves are used in thatching. The fibre, which is twisted into cordage, is obtained from the fibres which hang from the leaf-stalks and cover the stem. It is now exported to Britain from Pará. According to some writers, *Leopoldinia Piassaba* is the source of this fibre.

Chiquimu'la, the name of an isthmus on the eastern confines of Guatemala, Central America. Its breadth from the Caribbean Sea to the Pacific is 150 miles, no part of which exceeds an elevation of 2000 feet.

Chira'ta, or **Chirett'a**, the *Ophelia Chirata*, a plant used in medicine, belonging to the natural order *Gentianaceæ*. It is about 3 feet long, has the thickness of a goosequill, and the opposite branches flower in panicles. C. is pulled up by the root and dried. It is an excellent bitter tonic, without astringency.

Chiriqui', the name of a river in Costa Rica, Central America, which flows in a northerly direction, and is received by a deep spacious lagoon of the same name, which is separated from the Caribbean Sea by an archipelago, also called C. A mountain peak in the same state is likewise known by this appellation.

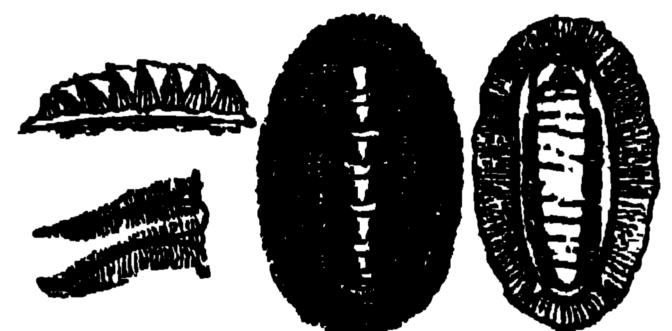
Chirr'a Pun'ji, a town on the Khasi Hills, Assam, British India, about 30 miles S. of Shillong, at an elevation of 588 feet above the sea. It is the headquarters of the Welsh Calvinistic mission. Stone is extensively quarried, and oranges and potatoes are grown for export to Calcutta. C. P. is said to be the rainiest spot in the world.

Chir'u (*Pantholops* or *Antilope Hodgsonii*), a species of Antelopes (q. v.) found in Thibet and on the Himalayan plateaux. It averages about 2½ feet in height and 5 feet in length, and possesses long annulated horns. A curious soft protuberance exists above each nostril. The C. is gregarious in its habits, and exceedingly wary and shy.

Chis'wick, a thriving village of Middlesex, on the left bank of the Thames, 7½ miles S.W. of St Paul's (London), and a station on the loop-line of the South-Western Railway. The Church of St Nicholas has monuments to Hogarth, Holland the actor, Lord Macartney, the Duchesses of Cleveland and Somerset, the Countess of Falconberg (Cromwell's third daughter), Sharp the engraver, Ugo Foscolo, and many other eminent persons. C. has breweries, coal-wharves, and many handsome villas. Here also are the nursery gardens of the Horticultural Society of London, and close by is Chiswick House, a residence of the Duke of Devonshire. Pop. (1872) 8508.

Chitine'. The solid parts of insects and other articulate animals, corresponding to the skeleton of the vertebrata, are mainly composed of this substance, which derives its name from *chiton* (Gr. 'mantle'). It may be obtained by boiling the wing-cases of beetles (best those of the cockchafer) with water, alcohol, ether, acetic acid, and solution of caustic potash in succession. Thus obtained, C. is a white horny substance, retaining the form of the texture from which it has been obtained. C. appears to belong to the group of bodies called *Glucosides* (q. v.); when boiled with dilute acids, it takes up the elements of water and splits into glucose or grape-sugar and other products. It has the composition represented by the formula $C_9H_{15}NO_6$.

Chi'ton, a genus of Gasteropodous mollusca, forming the type of the family *Chitonidæ*. These animals are distinguished from all other gasteropods by the possession of a *multivalve* shell, or one consisting of eight transverse plates which overlap each other. By means of the broad ventral foot, the chitons adhere to stones and rocks at low-water mark, after the fashion of the more familiar lampets. The gills form a series of lamellar or plate-like organs, situated posteriorly, and between the foot and the 'mantle' which lines the shell. *C. squamosus* is a familiar species, and *C. magnificus* is also well-known. Chitons of large size are met with on tropical shores.



Chiton Squamosus.

Chitt'agong, chief town of a district of the same name in the province of Bengal, British India, in the N.E. corner of the Bay of Bengal, on the Kurnafuli river. It is built on the extremity of a spur of hills, separating the Kurnafuli valley from that of the Brahmaputra. On the higher ground are situated the residences of the Europeans, while the native quarter occupies the low lands along the banks of the river. C., formerly called *Islamabad*, was selected by the Portuguese early in the 16th c. as one of their first settlements in this region, and was named by them *Xatigam* or *Porto Grande*. Their energy fostered among the natives a liking for a seafaring life, and to this day C. owns a great many of the native craft that trade about the Indian seas, and supplies a large proportion of the native seamen employed in the Indian marine and merchant service under the name of 'Lascars.' After C. passed into the hands of the English (1760) its prosperity gradually declined, as the produce of the country found its way to Calcutta through the Sunderbunds, though it still continued to build and own a fleet of native vessels, generally styled *Parriahs*. But in 1864 some European merchants began to settle in the place, and its former prosperity is again reviving. In 1873 it exported 104,565 tons of rice. During the past three years (1876-79) a portion of the jute crop of lower Bengal has been sent here for shipment instead of to Calcutta, and this trade is likely to increase. The tea-plant also flourishes, and there is now a considerable tea trade. The wood used in the construction of native vessels is called *jarool*, which, in water, is quite as durable as teak. Pop. (1872) 20,604, among whom are some descendants of the original Portuguese families.—The *district* of C. is flat for about 20 or 30 miles inland, and almost every foot of soil is cultivated. Round the villages are some fruit-trees, but there is no jungle till you reach the hills where the tea estates lie. Area 2498 sq. miles; pop. (1872) 1,127,402.

Chittagong Wood, the timber of several Indian trees, especially *Cedrela Toona* and *Chickrassia tabularis*. C. W. is valued in India for nearly all the purposes to which mahogany is applied in Britain, more especially when veined and mottled. Furniture made from it is light and beautiful, but apt to warp in dry weather.

Chittor', two strong towns in India are so named.—1. C. in the district of N. Arcot, province of Madras, 80 miles W. of Madras, on the right bank of the Puni, a feeder of the Palar, came into the possession of the British in 1801. Some remarkable ancient tombs were discovered in the neighbourhood, not unlike the Druidical remains in Britain. In the hot season (sometimes 140° in the sun) the river and tanks are dried up, and fever, ague, and dysentery prevail.—2. C., formerly the capital of the state of Odeypore, is about 270 miles S.W. of Agra, with numerous temples and buildings of note, including two richly carved towers of white marble dedicated to Siva. The fort stands on a steep isolated rock overlooking the town, and was once among the strongest in India.

Chiu'sa is the name of several small places in Italy, of which the most important are—1. **C. de Pesio**, a town in the province of Cuneo, N. Italy, 8 miles S.E. of Cuneo, with manufactures of silk and glass. Pop. 5900.—2. **C. San-Michele**, a village in the province of Turin, N. Italy, on the Dorea Ripense, at the foot of Mount Picheriano, on which stands the once famous Benedictine abbey of San-Michele, now a hospice for travellers, and the place of burial of the Sardinian kings.—3. **C. Sclafani**, a town of Sicily, province of Palermo, 33 miles S.S.W. of Palermo, with a pop. (1872) of 6840.—4. **C.**, a village of N. Italy, province of Udine, at the southern base of the Carnic Alps, on the Fella, and on the highway from Villach to Venice.

Chiu'si, a town of Central Italy, province of Siena, 37 miles S.E. of Siena, known in antiquity under the name of *Clusium*, one of the twelve Etrurian republics. It is historically famous as the residence of Lars Porsena. On the fall of the Roman Empire it was utterly destroyed. The whole valley in which it lies (*Val di Chiana*) was depopulated, and the place became a pestilential swamp. But in modern times, with improved drainage, C. is again thriving. The excavations of the last forty years have resulted in the recovery of a vast number of Etruscan remains, which are to be seen in the town's museum and also in Florence.

Chiv'alry (Fr. *chevalerie*, from *chevalier*, and hence literally meaning cavalry, in which sense the word is still occasionally used in romantic poetry) was a development under the auspices of the Christian Church of the ancient Teutonic custom, by which, after preparatory exercises, and ordeals of skill and courage, the youthful warrior was ceremoniously presented to the tribal assembly, and devoted to the public service. It must not be supposed, however, that the Church took advantage of an existing institution, and adapted it to the defence of the faith against the heathens of the middle ages. The fascination of adventure, the excitement of travel and combat, the passionate, if somewhat blind, veneration for woman, even the devotion to religion, then universally symbolised for Europe in one Church of splendid ceremonial and splendid piety; these were all strong, natural feelings, which the white dress, the fast and confession, the purification by water of the neophyte in C., his blessing by the priest, and his oath to defend the Church, served in some measure to express. Of necessity the knights were not free from the superstitious intolerance of their age; their patron saints and the Virgin Mary inspired them to acts of great cruelty and injustice. So also, as is seen in the degradation of the phrase '*par amour*,' the love of woman in the abstract, and the defence of widows and orphans, often lapsed into guilty intrigue, although the *Dame des Belles Cousines* had proved to *Jean de Saintré* that it was only true devotion to, and secret service of, one lady that could keep him free from the seven deadly sins. Even when this did not occur, the extravagant fancy of the lady sometimes imposed useless dangers on the knight, as in the combat against odds, the combat without arms, &c., while the absurd discussions of the Courts of Love (*e.g.*, on the question whether the most meritorious love was founded on report or on eyesight) readily degenerated into false notions of morality, married women being frequently chosen by the knights. This immorality increased after the Crusades, and grossly stains the *fabliaux* of Barbazan and Legrand and *Tirante le Blanc* (Valencia, 1480); while even the higher-class chronicles of *Amadis de Gaul* and Sir Thomas Malory's *Mort d'Arthur* (1470) are not free from bad morals. Much of the literature of C., however, belongs to the decline of the institution, and may have been written more for amusement than for history. The general tournaments, whether *à l'outrance* or with blunted weapons (the wooden spear-heads were called *rochets*), the special *pas d'armes*, and the judicial combats (in which the *preux chevalier* might always appear for the party without champion) no doubt fostered military skill, and gave the sanction of public renown to the duties of C. One of the most notable of these *pas*, mentioned by Froissart, in whose history is the best contemporary account of military C., was the Just of St Inglebert, or Sandzing Fields, at which three French knights withstood all comers. The custom of tournaments was shaken by the death in the lists of Henri II. of France (1559). The course of education in C. began when the *page* (about the age of twelve) was placed in the household of some knight or at the royal court, where he learned the use of horses and of arms, the art of hunting, and the duty of serving at table. There was a gentleman-page in the family of Buccleuch so late as the beginning of the 18th c. The page became a squire (Old Fr. *escuyer*, from Lat. *scutarius*, the *scutum* or 'shield'-bearer), who acted as groom and personal attendant on the knight, was entitled himself to carry a shield, and from whom the social accomplishments of the time were expected. If an esquire took a prisoner, the ransom belonged to his master. Later on, there arose a class of independent esquires, who, though never entitled to wear gilded spurs or a complete hauberk, had their own armorial bearings, and led their followers to battle under a pennoncele, or small triangular banner. At the age of twenty-one the squire received the *accolade*, or stroke of knighthood, generally from the knight he had served. This ceremony, performed sometimes on field of battle, often in church, or at a *cour plénière*, consisted in the squire, who had laid aside his brown coat and put on armour, receiving helmet, sword, and spurs, and being dubbed 'Sir' or 'Messire,' 'in the name of God and St Michael,' or with some other religious formula. Knighthood was a military rank, and conferred the right of assembling, and leading under a swallow-tailed pennon, at least 1000 men. Hence the power of conferring it was latterly monopolised by sovereigns; the knighting of Francis I. by Bayard being altogether exceptional. The surcoat, and the triangular *heater* or buckler shield (both of which bore the scutcheon of the knight), the dagger of mercy, the crest and device (which, like the scutcheon, became hereditary), were cha-

racteristic parts of the knight's equipment. When the knights-bachelor had in many cases become poor adventurers, living on the spoils of war or of the tourney, the order of knight-banneret was instituted. This was chiefly a military distinction, confined to knights of wealth and position who could bring to the field fifty men-at-arms with corresponding archers and crossbowmen. It was conferred by the commander-in-chief, who ordered the forked tails of the pennon to be cut off, thus converting it into a rectangular banner. In England a 'banneret' was one who had received knighthood on a field where the royal standard was displayed. The English order of the Garter was instituted by Edward III. after the jealousy of Philippe VI. had destroyed his project of a Round Table at Windsor. The courts of Europe introduced many ornamental titles, which were conferred on royal or noble infants by right of blood as well as on capable knights; and the degree of baronet, invented by James I. ostensibly to encourage the settlements in Nova Scotia and Ulster, being hereditary, was quite opposed to the principles of C. Disgrace of knights occurred on conviction of a heinous crime, or on defeat in the appeal to the judgment of God by single combat. Besides the loss of spurs and swords, peculiar bearings, called abatements, were given by the heralds to disgraced knights. C. first came into definite shape at the end of the 10th c.; its most brilliant period was in the 14th c., and it speedily declined before the introduction of regular mercenary troops, a movement initiated by Charles VII. of France (1445). See Sir Walter Scott's *Essay on C.* in *C., Romance, and the Drama*; St Palaye's *Chevalerie, considérée comme un Établissement Politique et Militaire* (Par. 1759–81); and Büsching's *Ritterzeit und Ritterwesen* (2 vols. Leips. 1823).

Chiv'alry, Court of, a court of which the Earl Marshal and Lord High Constable were judges. When it was merely a court of honour, the Earl Marshal presided alone, but both judges sat when it was a criminal court. This jurisdiction was established by Edward III., but when it was found to encroach on the common law, its sphere was defined by Richard II. It gave relief in matters of honour to such of the nobility and gentry as proved that they had been oppressed, and it guarded the distinctions of degrees and of quality. It is now quite a thing of the past.

Chivass'o, a town in the province of Turin, N. Italy, on the left bank of the Po, 15 miles N.E. of Turin by railway, has manufactures of earthenware, soap, and bricks, and is noted for its lampreys. The French razed the fortifications of C. in 1804. Pop. (1871) 7841.

Chive, or **Cive** (*Allium Schænoprasum*), a plant of the natural order *Liliaceæ*, and a cogener of the leek and onion. See ALLIUM. It is a native of marshy or flooded places in Europe and Asia, and is a rare plant of Britain. It is, however, a common garden vegetable, used for flavouring soups and dishes, in much the same way that onions are.

Chiz'erot, or **Bu'rin,** a name applied to several communities scattered over Sermoyer, Arbigny, Boz, and Ozan, communes of the department of Ain, and the arrondissement of Bourg-en-Bresse, canton Pont de Vaux. Like the Marans of Auvergne and the Lyzelards of St Omer, they do not intermarry with their neighbours, who hold them in contempt. They are chiefly labourers, cattle-breeders, and butchers, and are both industrious and rich. The women are fair, pretty, with quick black eyes, and form rather inclined to roundness. An incredible legend gives them a Saracenic origin. The Sermoyers, in particular, have come into collision with their neighbours about the pastures of the Saône.

Chlad'ni, Ernst Florenz Friedrich, the founder of the true theory of acoustics and music, was born, November 30, 1756, at Wittenberg. He travelled for many years through Germany, Holland, France, Italy, Russia, and Denmark, expounding his discoveries in popular lectures, and died, April 3, 1827, at Breslau. His principal works are—*Entdeckungen über die Theorie des Klanges* (1787); *Akustik* (1802, 2d ed. 1830); *Neue Beiträge für Akustik* (1817); *Beiträge zur prakt. Akustik und zur Lehre vom Instrumentenbau* (1822). See Bernhardt's *Dr Ernst C., der Akustiker* (Wittenb. 1856).

Chlæna'ceæ, a small order of Dicotyledonous trees and shrubs, containing only eight species, all natives of Madagascar. *Sarcolæna* and *Leptolæna* are examples of the genera, of which there are four described, but the properties or uses of none of the species are known. They are closely allied to *Sterculiaceæ.*

Chlamyph'orus, a genus of Edentate (q. v.) mammals (see also ARMADILLO) allied to the *Dasypodidæ* or armadilloes of S. America, and represented by the species *C. truncatus* of Chili, the average length of which is about 6 inches. The C. is sometimes known as the 'pichiciago.' As in other armadilloes, the integument secretes bony plates, and these are disposed in C. in the form of an armour-casing of square plates, investing the top of the head, back, and hind quarters, the plates terminating abruptly at the hind quarters. The other parts of the body are covered with a silky fur. The feet are provided with strong claws adapted for digging. The tail is scaly, and is generally applied closely to the belly; but it has been suggested that it may be used for throwing out the earth behind the animal as it burrows forwards.

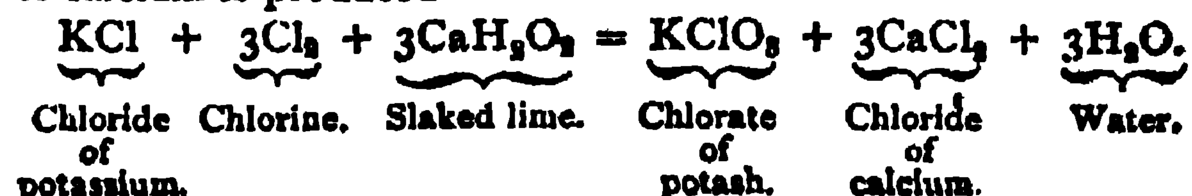

Chlamyphorus truncatus.

Chlo'picki, Joseph, a Polish soldier and patriot, was born in Galicia in 1772, and fought under Kosciusko in 1787. He subsequently served under Bonaparte, commanding the Polish legion at Eylau and Friedland during the Russian campaign. In 1814, on his return to Poland, he was well received by the Czar Alexander; but when the Polish insurrection of 1830 broke out, he was called upon by his countrymen, and made Dictator. The following year he resigned the office, on account of differences with colleagues of more extreme views. After the insurrection was crushed, he retired into private life. He died at Cracow, 30th September 1854.

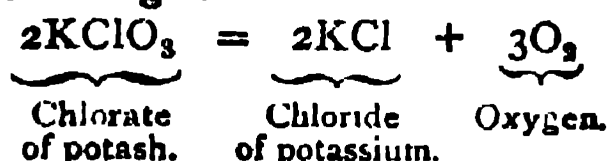
Chlo'ral is a substance which of late years has become of great importance on account of its narcotic properties. It was discovered by Liebig in 1832, but was first employed in medicine many years later by Liebreich. To prepare C. dry chlorine gas is passed into absolute alcohol as long as it is absorbed. The resulting liquid is then mixed with three times its volume of sulphuric acid, and allowed to remain for some time at rest, when it separates into two layers. The upper of these is C.; it is siphoned off and purified by rectification. C. is a colourless liquid, possessing a peculiar and disagreeable odour and taste. Its specific gravity is 1·802, and it boils at 99·6°. Its composition is represented by the formula C_2Cl_3OH. C. is *Aldehyde* (C_2H_3OH) (q. v.), in which three atoms of hydrogen are replaced by chlorine. C. unites with water to form a crystalline hydrate ($C_2Cl_3OHH_2O$). This hydrate is the preparation of C. used in medicine. Administered internally or by subcutaneous injection in doses of about 30 grains, it speedily procures sleep. Treated with alkalies, C. splits into formic acid and chloroform—a decomposition which by many has been supposed to occur in the body, thus explaining the therapeutic action of C. On account of the high price of alcohol in this country (owing to the duty), C. is chiefly manufactured on the Continent.

Chlorantha'ceæ, a natural order of Dicotyledonous plants, natives of tropical regions. There are about fifteen species, which possess aromatic stimulant properties. The roots of *Chloranthus officinalis* and *C. brachystachys* are used in Java as stimulants in malignant fevers, &c., and as anti-spasmodics. The flowers of *C. inconspicuus* (the 'chu-lan' of the Chinese) are used in China to give the 'cowslip flavour' to tea. Species of *Hedyosmum* are used in the W. Indies for much the same medical purposes as *Chloranthus.*

Chlo'rate of Potash is the potassium salt of chloric acid ($HClO_3$), and has become of importance in the manufacture of fireworks, of oxygen gas for the Lime Light (q. v.), and of Safety Matches (q. v.). Its composition is represented by the formula $KClO_3$. It is prepared commercially by acting upon a warm solution of chloride of potassium, in which slaked lime is suspended, with chlorine gas, when in addition to C. of P., chloride of calcium is produced—

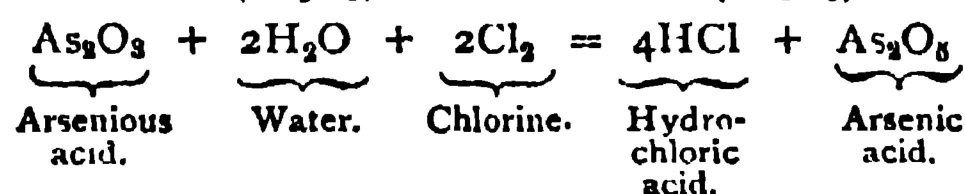


The solution containing the two salts is evaporated, and when sufficiently concentrated, allowed to cool. C. of P. being far less soluble than chloride of calcium, crystallises out and leaves the latter salt in solution. C. of P. gives up the whole of its oxygen when heated, a reaction which is turned to account in the preparation of that gas.



Mixed with charcoal, sulphur, or other oxidisable substances, it forms explosive or combustible mixtures, largely used in pyrotechny. C. of P. is also employed in medicine.

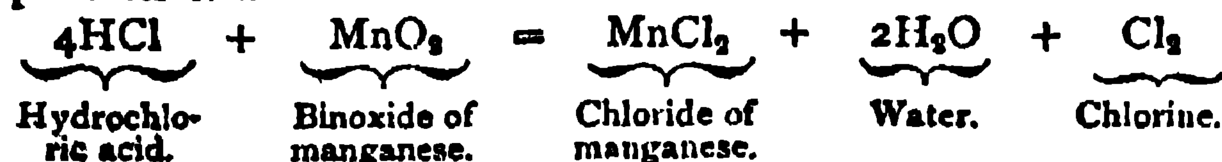
Chlorim'etry is the process by which the available chlorine in *bleaching powder* or *chloride of lime* is determined. By available chlorine is understood the chlorine which is set free when the bleaching powder is treated with an acid. The following is one of the many chlorimetric methods which are in use: it depends upon the oxidising properties of chlorine in presence of water. When arsenious acid is added to a solution of chloride of lime, the chlorine in the latter by removing hydrogen from the water sets free oxygen, which in the nascent state converts the arsenious acid (As_2O_3) into arsenic acid (As_2O_5). Thus



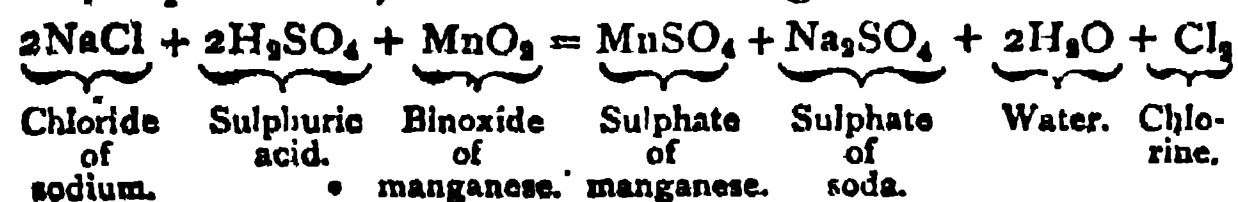
From the amount of arsenious acid which can thus be converted into arsenic acid by a given weight of chloride of lime, the quantity of available chlorine in the latter can be determined. The actual process is as follows:—10 grammes of the bleaching powder to be tested are rubbed in a mortar with water, the mixture decanted into a flask, and the mortar rinsed out with water, which is also put into the flask. The contents of the flask are then diluted till they occupy 1 litre. Next a standard solution of arsenious acid is prepared by warming 6·972 grammes of the acid with a solution of 10 grammes of dry carbonate of soda, till it is dissolved. The solution when cold is diluted to 1 litre. The solutions having been thus prepared, 50 cubic centimetres of the chloride of lime solution (equivalent to 0·5 grammes by weight) are placed in a flask or beaker, and the solution of arsenious acid gradually added from a burette, till a drop of the mixture ceases to strike a blue colour, when placed on a slip of paper which has been soaked in starch paste to which a little iodide of potassium has been added. When this point has been reached, all the available chlorine in the bleaching powder has been used up to oxidise the arsenious acid. With the above quantities every cubic centimetre of the arsenious acid solution is equivalent to 1 per cent. of available chlorine, hence the number of cubic centimetres added to the chloride of lime also represents the percentage of available chlorine in the latter.

Chlo'rine is one of the non-metallic elements, and under ordinary conditions is gaseous. It was discovered in 1774 by Scheele, and was called by him *dephlogisticated muriatic acid*. Sir Humphrey Davy first recognised its true nature, and gave it the name of chlorine from the Greek word *chloros*, signifying pale green.

C. occurs in nature in combination with metals: chloride of sodium or common salt being its most abundant compound. C. may be obtained by heating hydrochloric acid with binoxide of manganese, water and chloride of manganese being the other products of the reaction—



also, and more economically, by heating a mixture of common salt, sulphuric acid, and binoxide of manganese—



C. at ordinary temperature is a greenish-yellow gas, highly irritating to the lungs and mucous membranes, and exerting a corrosive action on all organised tissues. It is soluble to a considerable extent in water, and forms with that liquid, at a temperature of 0° C., a crystalline compound ($Cl_2 10H_2O$). Under a pressure of four atmospheres C. condenses to a yellow liquid, but this liquid has never been frozen. C. is not itself combustible, but is a supporter of combustion. A candle burns with a smoky flame when plunged into it. Copper and antimony, in a state of fine division, ignite spontaneously when introduced into the gas. C. has a very strong affinity for hydrogen, and forms with it an important compound called hydrochloric acid. A mixture of C. and hydrogen may be made in the dark without combination taking place, but if this mixture be ignited, an electric spark passed through it, or even be brought into sunlight, the two gases combine with a powerful explosion. The bleaching properties of C. are entirely due to its strong affinity for hydrogen. Moistened coloured fabrics at once lose their colour if plunged into C., but unless they be moist no effect is produced. The reason for this is, that the C. seizes on the hydrogen of the water to form hydrochloric acid, whilst oxygen (the other constituent of water) in the nascent state combines with the colouring matters, forming colourless compounds. C. is employed in immense quantities in the manufacture of *Bleaching Powder* (q. v.). Diffused in small quantities in the air, it is an admirable disinfectant. C. forms important compounds with the other elements, which will be considered elsewhere. Its compounds with oxygen are for the greater part unstable and readily explosive. C. has an atomic weight of 35·5, and the symbol for its atom is Cl.

Chloroc'odon, a genus of Natal climbing plants belonging to the natural order *Asclepiadaceæ*. The roots, *C. Whitei*, are used by the native tribes under the name of 'mundi' or 'mindi' as a stomachic.

Chlor'oform is a substance of immense value to the surgeon as an anæsthetic. It was discovered almost simultaneously by Soubeiran in France and by Liebig in Germany in 1831. The latter chemist, believing it to be a compound of carbon and chlorine, gave it the name of *perchloride* or *terchloride of carbon*; but in 1835 Dumas discovered its true composition, and observing that when treated with caustic potash, formic acid and chloride of potassium resulted, gave it its present name of C. Its anæsthetic properties were first recognised by Simpson and Bell.

C. is obtained by distilling a mixture of water, lime, chloride of lime (bleaching powder), and alcohol, when it passes over along with water, and is caught in the receiver. Being much heavier than water, C. is readily separated from it by decantation; it is next washed with water to remove alcohol, and later with a solution of carbonate of potash; afterwards it is dried with chloride of calcium and rectified. C. is a colourless mobile liquid of sp. gr. 1·48, and boils at 60·8° C.; it has a pleasant odour and sweet taste. It is an excellent solvent of caoutchouc, phosphorus, iodine, fats, many alkaloids, &c. Good C. is known by the following characters:—It should produce no colour when agitated with oil of vitriol, and no turbidity when mixed with a little water; a few drops evaporated on the hand should leave no unpleasant odour. C. contains carbon, hydrogen, and chlorine, and has the composition expressed by the formula $CHCl_3$.

For the use of C. as a medicine, see ANÆSTHESIA.

Chlor'ophyll, literally leaf-green (Gr. *chlōros*, green; *phyllon*, leaf), the substance in the cells of Plants (q. v.) which gives the green colour to the leaves, stems, &c., of plants. In the higher plants C. occurs in grains, each grain consisting of a plastic material and the colouring matter. According to Sachs, starch is formed by the C. granules; but this view, like many others of the same botanist, rests more upon imagination than fact. Withdrawn from the action of light the plant develops no C., and it has also been found that the presence of iron is essential to its formation. At one time it was believed to be only present in plants, but it is now known to give the green colour to *Hydra viridis*, *Stentor*, &c. The very various and often contradictory views which are held regarding it may be found stated in Brown's *Manual*, pp. 23-33, 219, and in Sachs' *Lehrbuch*, and in other recent works.

Chlo'rops. See CORN-FLY and WHEAT-FLY.

Chloro'sis, 'green sickness,' 'pallor of virgins,' is a peculiar form of Anæmia (q. v.), common in young girls about the age of puberty, characterised by excess of serum in the blood, and di-

minution of the red blood corpuscles. The countenance is of a pale waxy hue, the appetite is depraved, and there is irregular menstruation. The proper treatment consists in restoring the functions of the body by good food, plenty of fresh air, and the use of iron tonics.

Chloro'sis, in botany, a disease of plants, consisting of a pallid condition, 'in which the tissues are weak and unable to contend against severe changes, and the cells are more or less destitute of chlorophyll.' It may exist in plants exposed to direct light, and often the best culture will not restore the health of the plant. It is often beyond cure, but the best remedy, according to Mr Berkley, is to water the plant with a very weak solution of sulphate of iron.

Chlorosper'meæ, one of three divisions of *Algæ* or seaweeds, comprising three species, which have green spores; most of them have also green fronds.

Cho'card, or **Choquard**, the name given to a genus of *Corvidæ* or crows, allied to the choughs, but possessing a shorter bill than the last-named genus. The Alpine crow (*Pyrrhocorax Alpinus*) is the typical species of this genus.

Cho'co, a name given in the U. S. of Colombia, S. America, to a province and a bay. The first lies on the coast of the Pacific, in the state of Cauca, and has for its principal town Novita. The second forms the S. part of the Gulf of Darien.

Cho'colate (Sp. *chocolate*, from Mexican *chocolatl; choco*, 'cocoa,' and *latl*, 'water'), the ground seeds of *Theobroma Cacao* (see COCOA) made into a paste and mixed with sugar and various spices, and then formed into moulds and allowed to harden. It is eaten either solid, or dissolved in hot water, and taken like tea or cocoa. It is extensively used, especially on the Continent, and its nourishing qualities were proved during the siege of Paris in 1870-71, when it formed a great portion of the food of the inhabitants. It is adulterated with rice, meal, oatmeal, flour, starch, &c., and with benzoin, storax, &c., in place of vanilla and the other spices used to flavour it.



Chocolate Tree.

Cho'colate Root. See GEUM.

Choir (Fr. *chœur*, Lat. *chorus*, see CHORUS), that part of a cathedral extending eastward from the nave to the altar, and including the whole area set apart for the celebration of the services of the church. It is generally raised, at least, one step above the nave, and around its sides are rows of seats or stalls. The term is also applied to the staff of choristers or singers of a cathedral or church.

Choir-screen, a partition of open work in wood or stone surrounding the C., and separating it from the nave and side aisles. It is often encircled with niches, statues, &c., which are sometimes coloured and gilt.

Choi'seul, an ancient French family, which takes its name from the lands of C. in Champagne. According to Viguier, its founder was a certain Comte de Bassigny and de Boulogne-sur-Mer, who flourished in the 10th c.; but le Laboureur, whose opinion is more weighty, considers the family an offshoot of the old Comtes de Langres. It was in time divided into four great branches—C.-Beaupré, C.-Gouffier, C.-Praslin, and C.-Stainville—all of which are historically conspicuous, and furnished soldiers, prelates, and statesmen to their country. The last, however, which originated in the marriage of a C.-Beaupré (d. 1711) with his cousin-german Nicole de Stainville, may be regarded as the most illustrious. To it belongs **Etienne François, Duc de C.**, the ablest and most patriotic French statesman in the latter half of the 18th c. He was born 28th June 1719. After serving as Comte de Stainville with credit in the wars with Austria, he obtained the favour of the reigning mistress of Louis XV., Madame de Pompadour, and, through her, was appointed ambassador to Rome and Vienna (1756), and raised to the dignity of Duc de C. (1758). Under her he became in reality Prime Minister of France, and made himself very popular by a series of able diplomatic measures. He arranged the 'Family Compact' of the Bourbon sovereigns, secured for his country at the disastrous close of the war in 1763 better terms than had been expected, extended French commerce and influence especially in the W. Indies, where Domingo, Martinique, and Guadeloupe rose into importance, expelled the Jesuits (1764), and almost succeeded in freeing the Church of France from papal authority. For some years after the death of Madame de Pompadour, his influence in France and Europe continued great, and he was nicknamed by the Empress of Russia *Le Cocher de l'Europe* ('The Driver of Europe'). The rise of Madame Dubarry proved fatal to C.'s power, however, and he was compelled (1770) to retire to his estate at Chanteloup. His advice in political matters was frequently taken in the early part of the reign of Louis XVI. He died May 7, 1785. See the *Mémoires de M. le Duc E. F. de C., écrits par lui-même*, and Soulavie's *Mémoire de M. le Duc E. F. de C.*

Choke-damp remains in coal mines after an explosion of *fire-damp*, and consists of Carbonic Acid (q. v.).

Cho'king, in the human subject, may be caused by any substance, as a piece of meat, being arrested in its passage downwards, before it reaches the stomach, and producing suffocation by pressing on the Trachea (q. v.) or Larynx (q. v.), or by spasm of the muscles of those parts. Unless the obstruction be removed it may speedily produce death. The patient should be made to vomit by tickling the back part of his throat, or should try to force the substance down into the stomach by drinking water.

Chol'era, most probably from *cholas*, the bowels, and *rheo*, to flow, is one of the most fatal diseases known to man. The suddenness of the attack, the severity of the symptoms, and the great mortality of those affected, all tend to render it one of the most dreaded of diseases. The most prominent symptoms of C. are vertigo, a feeling of oppression in the præcordial region, nausea, vomiting, griping pains in the abdomen, frequent watery purging (the stools resembling rice-water), suppression of urine, and profuse perspiration. As the disease advances, there is coldness of the extremities; the skin of the hands and feet becomes shrivelled and dusky; the eyes sunken, the features pinched, cramps are felt in the limbs; there is oppressed breathing, intense thirst, rapid and small pulse, and sepulchral voice; the skin becomes cold and clammy, and a peculiar sickly odour is exhaled from the body, breath, and ejections. Reaction may supervene, or the disease may terminate within a few hours in fatal collapse. The early Sanskrit writers describe a disease called 'Vishuka,' the symptoms of which are identical with those of C. Hippocrates and Galen describe a similar disease in Europe, and Whang-shooho in China. Gaspar Correa, a Portuguese, was the first European who described an epidemic outbreak in Hindustan in 1503, and Sydenham states that C. morbus was raging in London in 1676. C. is endemic in the valley of the Ganges, and in all the large towns along the seaboard of British India, including Chittagong, and part of the Pegu division; but it frequently passes out of the endemic area, and becomes epidemic. C. has visited almost every country, the exceptions being remote islands and isolated populations. Great Britain has been visited four times within the present century (1831-32, 1848-49, 1853-54, and 1865-66). The first and second epidemics were the most fatal, and they were followed by many important sanitary improvements. The second epidemic cost England and Wales 55,181 lives; the third, 24,516; and the fourth, 15,669.

In 1866 there were 1170 deaths from C. in Scotland; several counties escaped, and in many the cases of C. were sterile. Aberdeen, Forfar, Fife, and Edinburgh were those most severely visited. The ravages of C. had been so destructive in Europe, that an international sanitary conference was held at Constantinople in 1866, and a second at Vienna in 1874, to determine regarding the origin, transmissibility, and prophylaxis of the disease. The late conference was attended by delegates from every European state, and also from Egypt and Persia. C. is propagated along the highways of human intercourse, and its dissemination bears definite relations to that intercourse. The morbific agents

contained in the *fomes* of C. patients, produces the same disease in others: it is probably less active when newly evacuated; so that excreta should be removed at once, and tainted clothing should be washed before the matter is allowed to become dry. The poison may enter the system by the respiratory passage from its being held in suspension, in connection with gaseous emanations, from C. dejecta in a confined atmosphere; or as an impalpable dust from dried excreta, and in this form it may be carried for a short distance by air currents; or it may enter by the digestive passages in connection with food or drink. The poison has the property of imparting its infective power to large volumes of water, and the danger to which a community is exposed is in exact proportion to the liability of its water supply being contaminated with C. excreta. A solitary case may be sterile, or may give rise to a general epidemic, according as the conditions for propagation are present or absent. The dejecta of a C. patient, gaining access by leakage or soakage to wells or reservoirs of drinking water, may thus give rise to a local or a general epidemic, and the mortality may be comprised within a few days, or extended over weeks or months. At Mecca, in 1865, where the pilgrims used a *single* or common water supply, there were 10,000 deaths in about six days; and in Zanzibar, in 1869, where there were many wells liable to contamination, there were 10,000 deaths within six weeks. C. is propagated to distant localities in a few days by those suffering from the disease during the period of incubation; or by means of contaminated clothing, the morbific matter being capable of producing its effects after fifteen or more days; but there is every reason to suppose that excrement-tainted water and air are the essential conditions of its local spread. Sanitary and hygienic measures, necessary for the maintenance of the general good health of a community, are sufficient to secure it against the ravages of C., and powers to enforce such measures are vested in local authorities. There is no disinfectant known which has the power of destroying the germs of the disease, but several are of great value, and should be used freely, such as chloride of lime, cupralum, ferralum, terebine, &c. There is no known antidote to the disease, but the administration of carbolic acid, on the first accession of symptoms, has been attended with favourable results. The treatment varies according to the stage of the disease, and, as it often runs a rapidly fatal course, no definite rule can be laid down applicable to all cases. C. being a filth disease, will disappear when communities are sufficiently enlightened to prosecute sanitary improvements. See Macnamara's *Treatise on Asiatic C.* (Lond. 1870); *Supplementary Report for* 1875 *of the Medical Officer of the Privy Council and Local Government Board; Papers concerning the European Relations of Asiatic C.;* and Christie's *C. Epidemics in East Africa* (Lond. 1876).

Choles'terine (*kolē*, bile, and *steros*, solid) is a crystalline substance, which was discovered by Conradi in 1775 in human gall-stones. It occurs also as a normal constituent of bile; in the brain, spinal marrow, and yolk of egg, and in various morbid growths. It has also been found in plants, in peas, maize, olives, &c. C. is readily obtained by boiling crushed biliary calculi with alcohol and a little caustic potash, the solution when filtered and evaporated depositing it in nacreous laminæ. C. possesses the properties of an Alcohol (q. v.), and is usually regarded as such. Its composition is expressed by the formula $C_{26}H_{43}(OH)$.

Chol'et, a town in the department of Maine-et-Loire, France, on the Maine, 32 miles S.S.W. of Angers by railway, has large manufactures of cambric, calicoes, flannels, &c., and an active trade in corn, cattle, and wine. The republicans gained two decisive victories at C. during the Vendean war in 1793. Pop. (1872) 11,328.

Cholu'la, an ancient town of Mexico, state of Puebla, 60 miles E.S.E. of the city of Mexico, on the tableland of Anahuac, and 6912 feet above the sea. It was the second largest city of the Aztecs, and at the time of the Spanish invasion had 20,000 houses and 400 temples. It is now rich in remains, the principal of which is the pyramidal temple of the Quetzalcoatl, 177 feet high, now surmounted by a Catholic church. Pop. 5000.

Chon'da, a village in the protected state of Gwalior, India, [illegible] miles N.W. of the town of Gwalior, and notable as the place where Sir Hugh Gough signally defeated the Mahrattas, December 29, 1843.

Chon'drin, a substance obtained by boiling the cartilages of the ribs, larynx, or joints in water for forty-eight hours, allowing the fluid to gelatinise, and treating the residue with ether to free it from fat. When dry, C. is a hard, horny, translucent substance, dissolving in hot water, but insoluble in alcohol or ether. It is precipitated by all acids, as well as by alum, sulphate of alumina, acetate of lead, sulphate of copper, ferric and ferrous sulphates, and mercurous and mercuric nitrates. It cannot be supposed to exist as C. in the body, but is the chemical result of certain substances after prolonged boiling in water.

Chondroden'drum, a genus of climbing shrubs belonging to the order *Menispermaceæ*. *C. convolvulaceum* is the wild grape of the Peruvians, so called on account of the form and flavour of its fruits being not unlike that of the vine. The bark is used as a febrifuge.

Chon'etes, an important genus of extinct Brachiopodous shellfish, belonging to the family *Productidæ*. They occur in Silurian and Devonian, but especially in Carboniferous rocks. The shell is concavo-convex, of oblong shape, and with a straight hinge-line. A row of tubular spines exists at the hinge-area of the ventral valve.

Cho'nos Archipelago consists of two large and about thirty small islands, which lie along a part of the W. coast off Patagonia, and to the S. of the Chilian island of Chiloe. They are extremely barren, and are inhabited only by a few tribes of Chonos, who live by fishing.

Cho'pin, Frederic Francis, a Polish musician, was born 1st March 1809, near Warsaw, where he studied music under Elsner. Exiled after the revolution of 1830, he took up his abode in Paris. There he was personally very popular; his music also was much admired, but his health was bad, and he suffered much from depression of spirits. He visited England in 1848, and was most cordially received, but the journey seems to have been too much for his strength. He died in Paris, 17th October 1849. He wrote largely for the pianoforte, chiefly in the form of nocturnes, polonaises, waltzes, &c.; his compositions are full of poetry and imagination. A monument was erected to him at Warsaw in 1869. See the sketches of Liszt (1852), Barbadette (2d ed. 1869), and Karasowski (1877).

Chop'in, a liquid measure in use before the present system of weights and measures was sanctioned by Act of Parliament. It contained in England ½ pint. In Scotland (under the form *Chapin* or *Chappin*) the name is still applied to a measure, used especially for milk, which is equal to a wine quart.

Chora'gic Monuments. The Choregus was the Athenian citizen appointed by his tribe to provide the various choruses that took part in the festive and religious celebrations. The Choregus who was thought to have best discharged this duty received a tripod as a prize. He had, however, to pay the cost not only of the prize itself, but also of erecting a chapel in which it was dedicated. A street in Athens contained so many of these monuments that it was called the Street of the Tripods. The names of the Choregus and his tribe were inscribed on the monument.

Chora'le, the psalm or hymn tune of the Protestant churches of Germany. It has generally a simple diatonic melody, which is sung in unison by the congregation, the harmonies being supplied by the organ, and sometimes by a choir and orchestra. The C. appears frequently in the works of the great German composers, and notably in those of Johann Sebastian Bach (q. v.). Bach's harmonies to many of the old Church melodies, while retaining an ancient form and ancient strict adherence to rule, remain unsurpassed and unsurpassable in intrinsic beauty, and give to the bare melody wonderful richness and loftiness.

Cho'ral Music, a term applied generally to all music written for a choir or chorus having a number of voices in each part. It includes, therefore, oratorios, cantatas, masses, motetts, and most anthems, as well as part songs, madrigals, &c., although it is not often used for the latter. See CHORUS.

Choral Service, the service of the Church of England as generally performed in cathedrals, with intoned responses and psalms, and the use of music throughout wherever it is authorised.

Chord, in music, a combination of notes performed simultaneously. Chords may be consonant or dissonant (see CONSONANCE), according to whether the intervals between each one of the notes of the C. and every other are concords or not. The consonant chords are those known as 'common' chords, and consist of a note with a third and fifth above it, or their octaves. When the combination is so made that either the third or the fifth are below the fundamental note itself, the C. is said to be inverted. Common chords may be built upon all the notes of the scale, but the C. of the Mediant (Si or Me) is seldom required, and that of Sub-tonic (Mi or Te) has an imperfect fifth, and on this account has often been excluded from the list of consonant chords. It is so very similar in effect to the much commoner common C. of the dominant with the seventh added ('dominant seventh' C.), that it is in any case unimportant. Common chords are called major or minor, according to the nature of their third. A seventh, a ninth, and so on, may be added to the common chords, and dissonant chords thus constructed. All these chords have their inversions like the common chords, and by this means they have immense variety in construction and effect. The ear can take pleasure in dissonance as well as consonance, but it cannot dwell upon the former as it can upon the latter, and for this reason the rules of Harmony (q. v.) prescribe certain *resolutions* of the sevenths, ninths, &c., which require to be attended to in all cases except those in which some special effect can be gained by disregarding them. One of the most useful dissonant chords found in modern music is known as the C. of the *diminished seventh*, and consists of three minor thirds, one above the other, as, for example, the G♯BDF. Besides its own peculiar effects, which vary very much with the notes of the key of which it is composed, it offers specially great facilities for modulation.

Chord, in geometry, is the straight line joining the extremities of an arc. Tables of chords, so common in old trigonometrical tables, are now superseded by tables of sines, which are much more convenient for calculating purposes. *C. of Curvature* is any C. of the circle of curvature drawn from the point whose curvature is represented by this circle.

Chor'dadorsa'lis, a name given to a delicate semi-transparent thread, at first cellular, but afterwards cartilaginous, which appears beneath the primitive groove in the early embryo. It is seen in the chick as early as three to eighteen hours after incubation. It ultimately contributes to the formation of the bodies of the vertebræ, part of it remaining persistent in the form of the intervertebral discs. It remains persistent in its cartilaginous condition in the lowest or Myxenoid fishes, such as in the lancelet or *Amphioxus lanceolatus*, the lamprey, the sharks, rays, and the *Chimæra*. See EMBRYO.

Chor'dæ Voca'les are the true vocal chords found in the larynx or organ of voice. They are the superior *thyro-anytenoid* ligaments. Attached by one border to the side of the larynx, the other border is free, and by its vibrations, caused by the current of air forced upwards through the trachea by the lungs, voice is produced. See LARYNX, VOICE.

Chore'a (Gr. *choreia*, a dancing or jumping), St Vitus' Dance, is an affection of the nervous system, characterised by peculiar tremulous movements of certain of the voluntary muscles especially of the face and limbs. It generally occurs in children from six to sixteen years of age, and is more common in girls than boys. C. may be caused by worms, fright, blows, teething, &c. It may be regarded as a form of bad health, and the proper treatment is to try to remove the cause by the use of good nourishing food, with iron tonics. Special attention should be paid to the bowels.

Cho'rion. At an early period of development of the mammalian ovum, the surface is found clothed with a covering having numerous villi or shaggy tufts upon it. This is the C. A description of its further development will be found under EMBRYO and PLACENTA.

Choris'ia is a genus of small prickly-stemmed trees of S. America, belonging to the natural order *Sterculiaceæ*. The silky hairs which cover the seeds of *C. speciosa* are used in Brazil (where it is known as *Arvore d' Paina*) for stuffing cushions, pillows, &c. The tough bark of *C. crispiflora* is used in the same country for making cordage.

Chor'ley, a flourishing town of Lancashire, on the Chor, 25 miles N.E. of Liverpool by railway, with manufactures of muslins, calicoes, cotton yarn, ginghams, and jaconets. There are also numerous bleachfields and dye-works, and near the town are several coal, lead, and iron mines, and quarries of millstones and slates. Pop. (1871) 16,864.

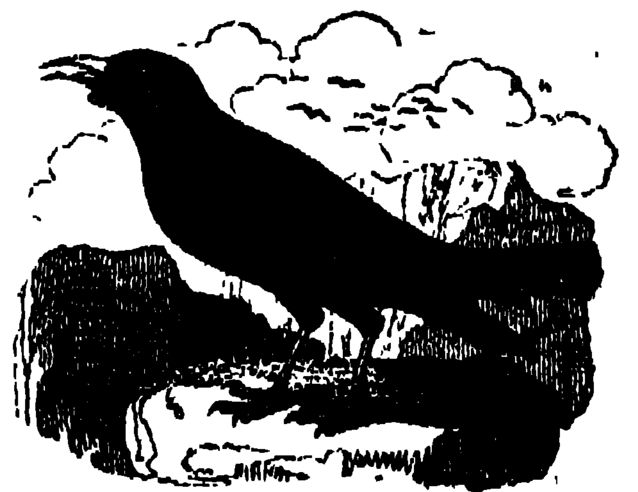
Chor'oid, a term applied in anatomy to various textures characterised by a shaggy appearance and a rich supply of blood-vessels. There is the C. plexus (see CEREBRUM) and the C. coat of the eye (see EYE).

Cho'rus, in music, signifies both a composition for numerous voices and the singers who perform the composition. Choruses are commonly parts of some large work, such as an opera or oratorio. In the former they are generally simple in construction, and often in three parts only, and have therefore come to be almost contemptible, while in the latter they play a most important part, and are correspondingly elaborate. The oratorio C. is generally in four parts (soprano, alto, tenor, and bass), but in some cases—notably in Bach's Matthew-Passion and Handel's Israel in Egypt—a double C. is employed.

Chose in Action, a term of English law denoting a thing of which no one has actual possession, and to which a right can only be constituted by legal decree.

Chou'ans, the name given to the insurgent royalists of Bretagne, from their first leader, Jean Cottereau, a smuggler and clogmaker, who inherited the sobriquet of Chouan (*chat-huant, i.e.*, screech-owl) from his grandfather, so designated from his sad and silent humour. Another explanation of the name refers it to the signal of danger among the smugglers—an imitation of the cry of the screech-owl—which was adopted by the insurgents. In 1792 an insurrection was planned by the marquis de la Rouarie in conjunction with the brothers of Louis XVI., and communications were opened up with Cottereau, who had organised a band of smugglers. The arrest of the marquis transferred the chief control of the movement to Cottereau, and the insurrection was henceforth named the *Chouanerie*. After some short-lived successes Cottereau was mortally wounded, 28th July 1794, near the wood of Misdon, having proved himself an intrepid soldier and a leader of considerable capacity. The movement, however, was not suppressed by the death of Cottereau, but under George Cadoudal (q. v.) and Charette assumed threatening proportions. The events of the 18th Brumaire dashed the hopes of the insurgents, but they were not finally suppressed till 1803, some time after the Vendeans had submitted to the First Consul. Occasional outbursts of an insurrectionary spirit exhibited themselves as late as 1830, following on the insurrection of July.

Chough, a genus of *Corvidæ* or crows, included in the sub-family *Pyrrhocoracinæ*. The C. differs from the true crows in having the bill notched slightly at its tip. The wings are also long and pointed, and the bill slender, long, and of curved shape. The tarsi are either scaly or covered with a single long plate. The choughs are gregarious in habits, and build their nests in rocks, steeples, and like situations. The Cornish C. (*Fregilus graculus*) is the best-known species. This bird is not now peculiar to Cornwall, but may be met with elsewhere, and usually near the sea-coast. It possesses red legs and bill, and is hence sometimes named the Red-legged C. or crow. The Chocard (q. v.), or Alpine crow, is the only other European species of C. The Cornish C. also occurs on the Continent, in N. Africa, Persia, and India. The food consists of grain, berries, and insects.


Chough.

Choya. See CHAY ROOT.

Chrism (Gr. *chrisma*, an 'ointment'), the unguent consecrated by the bishops in the Roman Catholic and Greek Churches for use in the sacraments of baptism, confirmation, orders, and extreme unction; being composed for the first three of oil and balsam (or in the Greek Church forty different spices); for the last, simply of oil.

Chris'ome was a white cloth, which used to be laid on a newly-baptized child after it was anointed with Chrism (q. v.), doubtless a relic of the white robe with which baptized persons were clothed in the early Church. See CANDIDATE.

Christ is the literal Greek translation (*Christos*, anointed) of the Hebrew word Messiah, and as applied to Jesus it means that he was the Messiah expected by the Jews. See MESSIAH, JESUS, and CHRISTOLOGY.

Christ, Orders of. An order of this name was instituted in 1205 by Albrecht, Bishop of Riga, to guard the Christians of Livonia against the heathens. Another was founded by Pope John XXII. in 1322, and reformed by Paul V. in 1615 as the Order of Jesus and Mary. The Portuguese Order of C. was formed in 1317 by Denis, or Dionysius, King of Portugal, from the Knights Templars (q. v.), whom Philippe le Bel expelled from France. The headquarters of the order were first at Castromarino, and afterwards at Tomar, whence they could more easily assail the Moorish kingdom of Granada. They shared in the wars with the Moors, and in the Portuguese expeditions to India. At first they held the lands they conquered, but these were afterwards handed over to the Portuguese crown. They still exist, and are said to possess twenty-six villages. Entrance to the order is granted only to Catholics of high birth.

Christ, Pictures of. In the records left to us of the life of C. there is not a single hint from which we could form the faintest conception of his personal appearance. But very soon attempts were made to satisfy the natural craving which the early Christians must have felt to know the personal appearance of one who was so dear to them. Two apparently contradictory views as to what his appearance ought to have been prevailed at different periods, the one being chiefly prevalent as it happened in the Eastern Church, the other in the Western, but without any contemporary controversy, as is sometimes asserted. The idea most consonant with the feelings of the humble and persecuted Christians of the second and third centuries, was that expressed in the words of Isaiah liii. 2, 'He hath no form nor comeliness, and when we shall see him, there is no beauty that we should desire him,' and the Christians of this period were ridiculed by Celsus for representing their God as of 'a mean aspect.' But the triumph of Christianity in the 4th c. brought a reaction, and the tendency then arose to represent him according to the words of the Psalm (xlv.), 'Thou art fairer than the sons of men.'

The first definite conceptions of C.'s appearance were portrayed by fictitious descriptions, of which two especially survive: the first in the letter of Publius Lentulus, a fabrication of the 3d c., '(?) in which C. is described as 'a man of lofty stature and handsome, with wavy glossy hair, the colour of wine, and golden at the root, flowing down on his shoulders, and parted in the middle; his forehead smooth, his countenance beautiful, with a slight blush, and his eyes bright and sparkling; his beard abundant and reddish, not long, but forked.' Another description occurs in the writings of Joannes Damascenus (8th c.), according to which C. was 'stately, with eyebrows joined together, beautiful eyes, curly hair, black beard, and yellow complexion.' The descriptions, of which these two were doubtless but specimens, were followed by pictures attempting to embody them, for the faithfulness of which various evidence was found, as, *e.g.*, that Luke, as well as Pilate, took C.'s likeness, and that Peter drew it from memory.

There were various legends also regarding P. of C. said to have been impressed upon cloths. One of these was possessed by Abgarus, King of Edessa, who, being afflicted with an incurable disease, and having heard of the miracles of C., sent a letter to him, asking him to come and heal him, on which he received a letter from C. and his portrait impressed on a cloth. According to another legend, a similar portrait came into the possession of Veronica or Bernice, the woman cured by touching C.'s garment (Mark v.) [otherwise merely a woman of Jerusalem, who offered him her veil to wipe his face on the way to Calvary], who greatly desired to have his portrait, and found it impressed on the cloth with which he dried his face on washing when he came to visit her. The woman is manifestly a second invention to help out the first, her name being merely a corruption of *vera icon*, true image, the name given to the picture.

As to the physiognomy given to C. in his portraits, the type of features with which we are now most familiar—oval face, straight nose, and long curling hair parted in the middle—was not invariably adhered to, but was confined to the Byzantine school of art, and even in it was not constant. The fact is, that so long as C. was represented like other men, the type of his head was, generally speaking, the characteristic head of the different nations. He was left with a character of his own only when the Italian masters of the Renaissance, headed by Fra Angelico, gave a personal individuality to those about him, and then the characteristic expression which above all was given to him was *sympathy*. Perhaps the noblest conception of the Son of Man which art attained to was that of Leonardo da Vinci, in his picture of 'the Last Supper.' But the attention of the great painters was devoted to depicting the features of C. when dead or glorified rather than when alive; the Madonna and Child being also a favourite subject. See Lord Lindsay's *History of Christian Art* (Lond. 1847), *The History of Our Lord, &c.* (1864), by Mrs Jameson and Lady Eastlake, and a series of articles in the *Art Journal* for 1861.

Christ or **Chris Cross Row**, the alphabet arranged in the form of a cross, with the letter A at the top and Z at the foot.

Christ'church, a municipal and parliamentary borough and seaport in Hampshire, at the confluence of the Avon and the Stour (hence its old English name *Tweon-ea*, 'between the rivers'), 24 miles S.W. of Southampton. The priory church (restored 1861) dates from the reign of William Rufus, and contains an old sculptured altar-piece said to be one of the finest in England. There is also a free grammar-school and commodious barracks. C. has breweries and some manufactures of watch-springs and hosiery. Pop. (1871) 15,415. Roman remains have been found in the neighbourhood.—*C. Bay* is a spacious harbour, with a double tide every twelve hours, but is obstructed by a moving sand-bar, so that vessels drawing 5 or 6 feet can only enter at high tide. C. returns one member to Parliament.

Christ-Church, one of the chief towns of New Zealand, and capital of the province of Canterbury, is situated on the E. coast of Middle Island, on Pegasus Bay, to the N. of Banks' Peninsula. It lies on the river Avon, 9 miles from the port of Littleton by railway, and is also the point where two coast lines of railway, from N. and S. respectively, converge. There is an extensive export trade, chiefly in wool and timber. Pop. (1871) 6747.

Christ-Church, The Cathedral of. The foundation at Oxford of C.-C. was projected on a scale of great magnificence by Cardinal Wolsey, who in 1526 obtained from Pope Clement VII. a bull for the suppression of twenty-two monasteries, the site of one of which he selected for the erection of a college, to be called in honour of himself Cardinal College. On his disgrace in 1529, Henry VIII. took possession of it, and three years later refounded it as King Henry VIII.'s College, a title exchanged in 1546-47 for that of C.-C., which it still bears. The foundation consisted of a dean, eight canons, one hundred students (to which one was added in 1664, by a benefaction from William Thurstone, Esq.), eight chaplains, a schoolmaster and organist, eight clerks and eight choristers. The canonries, which at first had no duties assigned to them, have been from time to time annexed to professorships in the university, and no canonry can now be held except by a professor, the archdeacon, or the sub-dean. By 30 and 31 Vict. cap. 76, the number of canons is reduced to six; of students to eighty, twenty-eight of which are senior students with permanent tenure, and fifty-two junior students; twenty-one of these fifty-two must be elected from Westminster School, three each year on the Wednesday before Ascension Day, with a tenure of seven years. The election to the remaining thirty-one open junior studentships, which are tenable for five years, is held on the second Saturday in Lent. In 1875 there were 1146 members on the books, not including unmatriculated members of the choir. The college has the patronage of ninety benefices.

Chris'tening, as a synonym for Baptism, properly conveys the notion that a person is made a Christian in, or by, that rite; and is used in this sense by those who believe in baptismal regeneration, but is also used without any such reference.

Christian, the name of nine Kings of Denmark, of whom the following are the most notable:—**Christian I.**, son of Dietrich,

the Lucky, Count of Oldenburg and Delmenhorst, born in 1426, became King of Denmark in 1448, and was King of Sweden from 1457 to 1467. He founded the University of Copenhagen in 1478, and died 22d May 1481.—**Christian II.**, King of Denmark and Norway, and Duke of Slesvig-Holstein, surnamed the Wicked, was born at Nyborg, Fünen, 2d July 1481. He was elected heir-apparent to the throne of Sweden in 1499, and became King of Denmark and Norway in 1513. To ally himself to the most powerful house in Europe, he married Isabella, sister of Karl V., at Copenhagen, 12th August 1515, but he continued his intercourse with his mistress, Düveke, a beautiful peasant girl of Dutch origin with whom he had become acquainted at Bergen. Meanwhile he sought to develop the trade of Denmark, and raise the status of the burgher class, after the model of the Netherlands, thereby exciting at once the jealousy both of the Hanse towns and of the nobility. His war against Sweden (1518–20) was marked by a horrible massacre known as the 'Stockholm Blood-bath,' which roused the Swedes to assert their independence under Gustavus Vasa (q. v.). Attacked by the Hanse towns, and abandoned by his Danish nobles, C. fled for safety and help to Holland (1523), returned and landed in the S. of Norway 1531, but was defeated, and taken prisoner at Aggerhuus in 1532. He died 25th January 1559, a captive in the castle of Kallundborg in Seeland.—**Christian IV.**, King of Denmark and Norway, and Duke of Slesvig-Holstein, was born at Fredricksburg, Seeland, 12th April 1577. After the death of his father he was elected by the States to the throne, 4th April 1588, and undertook the government of the kingdom himself in 1596. Though bold and enterprising, his foreign policy was unsuccessful, with the exception of his war against Sweden (1611–13). Fortune favoured him neither in the Thirty Years' War nor in his second Swedish war (1643–45); but he was, notwithstanding, the most popular sovereign of the Oldenburg stock. His legislative and administrative reforms were highly beneficial to his country; he did much for the development of trade and commerce, and acquired Tranquebar, the first Danish colony in the E. Indies. He died 28th February 1648.—**Christian VII.**, King of Denmark and Duke of Slesvig-Holstein, was born at Copenhagen, 29th January 1749, and succeeded his father, Fredrick V., 14th January 1766, marrying the Princess Caroline Matilda of England on November 8th of the same year. Soon after he exhibited symptoms of mental aberration, and the possession of supreme authority became the subject of factious strife. For some time Count Bernstorff and the ministers of the late king administered the state, but in 1770 they fell before the influence of Struensee (q. v.), who in turn succumbed to the superior energy and sagacity of the queen-mother, aided by her son Prince Fredrick. Henceforth C. was king only in name. His son, Fredrick VI., April 14, 1784, displaced his uncle, the crown-prince, and the queen-dowager, and assumed the government himself, assisted by the advice of the young Andreas Peter Bernstorff. C. died 13th March 1808.—**Christian VIII.**, King of Denmark and Duke of Slesvig-Holstein and Lauenburg, was born 18th September 1786. He was acting as Stadtholder in Norway when his father, Fredrick, by the treaty of Kiel (14th January 1814), was compelled to cede that country to Sweden. C. tried to maintain himself in the country by the force of popular feeling, but an English fleet and a Swedish army were too much for him, and he was compelled to withdraw. Succeeding his father as King of Denmark in 1839, the remainder of his life was devoted to the purpose of thoroughly incorporating the Slesvig-Holstein duchies with the Danish monarchy. He died 20th January 1848, in the midst of a work that led to the gravest European complications, but the issue of which has been very different from what C. anticipated.

Christian Burial. See BURIAL, FELO DE SE.

Christian Charity, Knights of, a French order founded by King Henri III. for the support of meritorious officers and soldiers who had been maimed in warfare, the revenues of which were drawn from all the hospitals in the kingdom. Henri IV. gave solidity to the institution by placing it under the charge of the marshals and colonels of France. It was the germ of *Les Invalides*, founded by Louis XIV., on the model of which the British hospitals of Chelsea and Greenwich were founded.

Christian Connection, in the United States, is a sect formed from offshoots of the Methodist, Baptist, and Presbyterian Churches in the early years of the present century. Its members regard the Bible as their only rule of faith and practice, and 'Christian' as their only name, but they deny Christ's divinity. They practise immersion and encourage revivals. The body has 3578 churches, two colleges, two academies, and several periodicals.

Christian Knowledge, Society for Promoting, under the patronage of the Queen, and the presidency of the Archbishop of Canterbury, is the oldest association of the kind in connection with the Church of England. Set agoing in 1698, under the name of 'The Society for the Propagation of the Gospel,' chiefly by the exertions of Thomas Bray, who afterwards distinguished himself as a missionary in Maryland, and wrote *Proposals for the Encouragement and Promoting of Religion in the Foreign Plantations*, it was incorporated under its present name in 1701. Its object is chiefly the establishment of churches, schools, and libraries, and the circulation of Bibles and other religious literature in the colonies, where its income is chiefly expended.

Christian'ia (Norw. *Kristiania*), the capital of Norway, romantically situated on the innermost bay of the C. Fiord, which stretches 70 miles N. from Skager Rack. It lies in a fine valley, at the base of the Egeberg, a wooded mass of gneiss, and is the residence of the king, and the seat of the government, of a bishop, and of the superior courts. Its chief buildings are the old feudal castle of Aggerhuus, a fine modern cathedral, a university (since 1811) with twenty-two professors, over 700 students, and a library of 150,000 books, a royal villa (Oscar's Hall) of Gothic architecture, an exchange, and a theatre. The town is now lighted with gas, and supplied with water from the beautiful Maridall Lake. There are large manufactures of cottons, woollens, paper, oil, soap, brandy, beer, tobacco, &c., and an export trade chiefly in timber, skins, iron, herrings, anchovies, and game. C. has regular steamboat communication with various ports of Germany and Britain, and is the key to the railway system of Scandinavia. A fleet of 180 vessels belongs to the port, which is free of ice for eight months of the year. In the fiord, near C., are many picturesque islands, on one of which (Hovedö) stands the ruins of a convent founded by Cistercian monks from Lincoln in 1147. The vicinity is rich in the wild scenery of fiord, and fell, and rushing river. Pop. (1876) 77,041, and including suburbs 97,000. C. occupies the site of the old royal town of Opslo, which was burned by Christian IV. in 1624 to make way for the present city.—The *stift* or *province* of C. has an area of 10,053 sq. miles, and a pop. (1865) 448,374. See *Norway: an Illustrated Handbook for Travellers* (edited by Christian Tönsberg, Christiania: Lond. Trübner & Co. 1875).

Christian'ity is the religion founded by Jesus Christ (q. v.), by whom, its professors maintain, the highest manifestation of God to man was made. As compared with other systems of religion—Polytheistic, Dualistic, Pantheistic—C. is to be considered Monotheistic. Here, however, a distinction is made by some between the C. of Christ and that of the Church, which latter is charged with running into Ditheism (see CHRISTOLOGY), a charge, however, always strenuously repelled by the Church. The C. of Christ had for its essential features the 'fatherhood of God and the brotherhood of man; the necessity and the value of the feelings of repentance, and assurance of pardon; a faith in the unseen and eternal, in the ultimate triumph of good and subjugation of evil, and in a retribution which shall render to every man according to his deeds.' The sum of this religion was a divine life springing from faith in God; or, as the apostles preferred to conceive it, from faith in Christ as the Revealer of God. No other religion depends so much on the person of its founder as C.; other religions rest exclusively on the teaching of their founders, but it, on what Christ was and did. The earliest Christian writers soon began to maintain that moral transgressions were of less importance than errors in doctrine, and the C. of the Church by-and-by came to be identified with a belief in the elaborate system of doctrine which was gradually developed during the first six centuries.

The central doctrine of C. is that of the Atonement (q. v.), but it again is based on another. The fundamental doctrine is that of human depravity or Original Sin (q. v.), the state into which mankind were brought by the Fall (q. v.). All men being sinners, they cannot be saved by any effort or resource of their

own. Hence arises the necessity for the atonement of Jesus Christ, which was the satisfaction made by the eternal Son of God in his death upon the cross, to God the Father for the sins of men. Upon this now hinges the doctrine regarding the Incarnation of Christ, the Trinity, and Justification (q. v.). Another distinctive doctrine of C. is the existence of, or rather the prominence assigned to, Satan, the Prince of Darkness, by whom our first parents were tempted to sin, and into whose power the damned are finally and eternally consigned. Regarding a future life, C. holds that at the resurrection at the last day all who have benefited by the atonement of Christ will go to spend an eternity of bliss in heaven, those who have not, to an eternity of torment in Hell (q. v.), the domain of Satan.

As it may be seen under Christology how much of the language of pagan philosophy was employed to express the Church's doctrine of the Son of God, it is also interesting and instructive to notice how far her ceremonial in honour of Christ corresponds with the pagan Sun-worship, and even how far incidents in the life of Christ coincide with the same. In the worship of Hercules, Adonis, Apollo, Bacchus, Mithra, Krishna, &c., the sun was adored as incarnate in human form, born of a virgin, underground (the birthplace of Christ is now shown in an underground grotto), in his infancy subjected to perils, and afterwards killed through the serpent or principle of evil, but by his death redeeming mankind, rising again and ascending into heaven, to become the arbiter of life and death. The birthday of the sun-god was at the winter solstice, at which time falls also the Christian festival of Christmas; and he rose again from the dead at the spring equinox, at which time is the festival of Easter (q. v.). Similar coincidences exist in connection with the Virgin Mary (q. v.). Even the sacrament of the Eucharist or the Lord's Supper has a remarkable coincidence with the Eleusinian mysteries, from which the name of Holy Mysteries, as well as some of its rites and symbols, were borrowed, including the monogram IHS surrounded by (the sun's) rays of glory. These Greek letters, representing Iakchos Hēmōn Sōtēr (Bacchus our Saviour), are made to represent the Latin words Jesus Hominum Salvator (Jesus the Saviour of men), although the Greek character H is E, not H. It is not, however, to be supposed that these coincidences in any way invalidate the claim of C. to be considered a religion of divine origin. The life of Christ was not an artificial, imaginary, or non-natural life; on the contrary, it was profoundly real and human. What else, then, could be expected, but that in its great outlines it would exhibit striking resemblances to the lives of heroes and demigods in all the legends of religious history? A divine life must have innumerable 'imitations.' Men everywhere, but most conspicuously in the higher forms of ethnic religion, are ever striving after that ideal which was revealed in the Son of God. Moreover, it should not be forgotten that when C. came into the world it did not find the religious sentiment a blank, or religious rites and usages unknown. The earth was full of these. C. appropriated them wherever this could be done without hurt to its divine character. Half the ritual of the Church has its root in Roman or Teutonic paganism; but it is puerile to argue on this ground that C. has a pagan element. It drew to itself, baptized and purged of all impure or discordant associations, the numberless usages of an overthrown worship, but it did this in obedience to a wise instinct, and by doing so, consciously or unconsciously, testified to the sincerity of its pretensions as a universal religion.

The evidences for the truth of C. have usually been divided into external and internal. I. The external include—1. The testimony (1) of the original witnesses—*i.e.*, the New Testament writers; and (2) of subsequent witnesses—*i.e.*, the Christian fathers. 2. The miracles wrought in attestation of it, both by Christ and his apostles, and especially the crowning miracle of the Resurrection. 3. Prophecy (1) in the Old Testament regarding Christ, and (2) in the New Testament regarding events—*e.g.*, the destruction of Jerusalem—to happen after the time of Christ. II. The internal include—1. The consistency of the New Testament with itself, seen, *e.g.*, in undesigned coincidences and the candour of the writers, and with contemporary literature. 2. The purity of its morality as compared with that of any other known system of religion. 3. The mean condition of the men in whose writings this superior system appears. 4. The correspondence between the doctrines of C. and the facts of our own nature. 5. The identity and originality of Christ's character, as well as that of the apostles. 6. The impossibility of accounting for it (1) by the state of the world at its birth, or (2) by any of the motives which instigate men to the fabrication of religions. Less importance is now attached than formerly to some of these arguments. Thus, it used to be considered a strong argument that at the time of the origin of C. there was nothing human to account for it—that 'the incongruity between this religion and all the circumstances amidst which it grew up was so remarkable as to render it necessary to look beyond and above this world for its explanation.' But a better acquaintance with contemporary literature has shown this position to be untenable, and to be particularly weak as an argument for the supernatural origin of C. As to Judaism, were not our ideas regarding the relation between it and C. greatly confused, it would never have been supposed that the New Testament, which was written 'among Jews, by Jews, for Jews,' did not speak the language of the time. The period when C. arose was that of the Mishnic development of the Talmud, and such terms as redemption, baptism, grace, faith, salvation, regeneration, Son of Man, Son of God, kingdom of heaven, were household words of Talmudic Judaism. The ethics, also, of the Talmud and of C. are, in their broad outlines, identical, including the golden rule, which was quoted as a well-known saying, 'comprising the whole law,' by Rabbi Hillel, who died when Jesus was ten years old. The glory of C. is not to have invented these ideas, but, as has been said, 'to have carried those golden germs, hidden in the schools and among the silent community of the learned, into the market of humanity' C. was also affected by pagan philosophy, chiefly through the Alexandrian Philo, whose theology was 'in great measure founded on his peculiar combination of the Jewish, the Platonic, and the Neo-Platonic conception of God.' The teaching of the Jerusalem rabbis—*e.g.*, Hillel and Gamaliel—was tinged with Philonism, and the Apostle Paul, the disciple of the latter, was undoubtedly imbued with these Alexandrine ideas, which he introduced into C. But although it is thus seen that an argument for the supernatural origin of C. cannot be founded on the incongruity between it and the circumstances amidst which it grew up, it need be no argument against it that so many contemporary ideas were incorporated with it. For although C. is something communicated to nature and reason from a higher source, it stands in necessary connection with these powers and with their mode of development. Otherwise it would not be fitted to raise them to higher perfection, or be able to exercise any influence upon them at all.

It ought to be remembered that C. cannot be identified with the creed of any particular section of the Church. Its fundamental essence lies, not in speculations regarding the being and constitution of God, but in living a pure and godly life, in catching the spirit and obeying the teaching of Christ. Every one who has studied Church history knows how liquid the doctrine of the Church has been; the one unchangeable element of it being the historical person of Christ. And as Jesus said, 'The words that I speak unto you, they are spirit, and they are life,' these words, which are the primal indefeasible truths of C., will never pass away. See Neander's *Kirchengeschichte*; Parker's *Discourse of Religion*; Paley, Chalmers, &c., on the *Evidences*; Greg's *Creed of Christendom* (3d ed. 1874); E. Deutsch on the *Talmud* (*Quart. Rev.* October 1867, or *Lit. Rems.* 1874); Philo's Works (cf. Jones's *Ecclesiastical Researches*); Milman's *Hist. of C.*; Keim's *Der geschichtliche Christus* (3d ed. 1866; Eng. 1873).

Chris'tiansand (Norw. *Kristiansand*), the harbour and chief town of a province of the same name, Norway, in the *amt* or *bailivik* of Mandal, at the mouth of the Torredalselv (*Otteraa*), on the Christiansandfjord, is the seat of a bishop and of the provincial courts, and is also a naval station, with a growing trade in wood, copper, iron, dried fish, salmon, &c. It is also a naval arsenal, and forms the central point of the Scandinavian steam navigation. There are manufactures of leather, tobacco, cotton, and beer, besides extensive dyeworks and shipbuilding yards. The cathedral is the principal building. Pop. (1876) 12,137. C. was founded by Christian IV. in 1641, after whom it is named. The province or *stift* of C. lies in the S.W. of Norway, includes the bailiviks of Nedenäs, Lister, Mandal, and Stavanger, with part of Bratsberg, and has an area of 14,870 sq. miles, and a pop. (1872) of 330,000.

Chris'tianstad (Swed. *Kristianstad*), a fortified town of Sweden, and capital of a province of the same name, on the

estuary of the Helge, in the Baltic, 270 miles S.W. of Stockholm by railway. It has an arsenal, a fine church, a senate-house, several high-class schools, and its manufactures are chiefly woollens, leather, gloves, and tobacco. Pop. (1872) 6222. C. was founded in 1614 by Christian IV., from whom it takes its name. The *län*, or province, has an area of 2457 sq. miles, and a pop. (1875) of 228,498.

Chris'tiansted, the capital of the Danish island of Santa Cruz, W. Indies, lies on the N.E. coast of the island, and is defended by a battery. It is the residence of the Danish governor of the W. Indies, and has a good harbour and some trade. Pop. about 6000.

Chris'tianssund (Norw. *Kristiansund*), a town frequently confounded with Christiansand, is situated in the amt or bailivik of Romsdal, in the N. of Norway, and has an export trade in wood and fish. It was a flourishing place of trade in the 17th c., and bore the name Lille-Fosen till 1742. Pop. (1876) 7489.

Christi'na, Queen of Sweden, the only child of Gustav Adolf and of Maria Eleonora, Princess of Brandenburg, was born 6th December 1626. She succeeded her father in 1632, assumed the reins of government in 1644, and in 1650 was crowned *king*. The originally masculine character of her mind was intensified by a too robust education. She hated to be dressed like a woman, often clothing herself in male attire, and was keenly fond of riding and hunting. Yet for some years she ruled with vigour and intelligence, patronising scientific and learned men. Indeed, so long as the great chancellor Oxenstierna lived she did well. But eccentricity, if not insanity, began to develop itself in her, and in 1654 she abdicated the crown in favour of her cousin, Karl Gustav, reserving to herself sufficient revenues to maintain her in royal state. C. next went to Rome, and embraced Roman Catholicism under the name of Alessandra. For a time she resided in France, where she incurred great odium by the execution for treason of her equerry, the Marquis Monaldeschi. Attempts subsequently made on the crowns both of Sweden and Poland failing, she spent the remainder of her life in Rome in artistic and scientific studies. She died April 19, 1689. C. left behind her some small works, which may be found in Archenholz's *Memoiren der Königin C.* (4 vols. Berl. 1751–60). The genuineness of the 'Letters' which appeared under her name in 1762 is undoubted. See Grauert's *C., Königin von Schweden und ihr Hof* (2 vols. Bonn, 1838–42).

Chris'tison, Sir Robert, D.C.L., born July 18, 1797, at Edinburgh, where his father, the late Alexander Christison, was Professor of Humanity in the University. After graduating here in 1819 as M.D., C. spent some time in London and Paris, applying himself to the study of toxicology, in connection with which his name is deservedly famous. After his return to Edinburgh, he was appointed Professor of Medical Jurisprudence in 1822, and ten years later Professor of Materia Medica, which chair he holds at present. His *Treatise on Poisons* (1829) has a world-wide reputation, and is the standard work on the subject. *A Biographical Sketch of Edward Turner, M.D.* (1837), *On Granular Degeneration of the Kidneys* (1839), and *The Dispensatory* (1842), may be mentioned among his other works. C. is Ordinary Physician to the Queen in Scotland, has been twice President of the Royal College of Physicians, was created a baronet in 1871, was President of the Royal Society of Edinburgh (1868–73), and is President-elect of the British Association for 1876.

Chris'tmas is the anniversary of the birth of Jesus Christ, observed on the 25th December. The Western Church, in which it appears as generally celebrated after the middle of the 4th c., has always kept to this day; the Eastern observed it first on the 20th April or 20th May, then, along with the Feast of the Epiphany (q. v.), on the 6th January; but at the close of the 4th c. altered its practice to suit Western usage. St Chrysostom, in advocating this change in the East to the true day, which, formerly uncertain, had been made known by some coming from the West, indicates the existence of a tradition in the West that the angel appeared to Zacharias to announce the birth of John the Baptist on the great day of atonement—September 23d, from which C. was reckoned. Nine months from this date gives June 24th, John Baptist's Day; and six months more (cf. Luke i. 26 and 36) gives December 25th. This was the date of the great heathen festival of midwinter, and it may be that the tradition was moulded to suit that circumstance. The winter solstice was the birthtime of the sun about to return towards the earth, which was celebrated with all manner of rejoicing and revelry. At Rome this was the Saturnalia (q. v.), which included the Sigillaria or *festival of the infants*. The Church was probably unable to abolish the pagan revelry, but it could at least surround it with other and more sacred associations, and thus gradually wean its converts from all memories or attachments incompatible with their new faith.

Christmas-Box, a gift in money which it was formerly a prevailing custom in England to give on the day after Christmas—Boxing-Day—to domestic servants, apprentices, and other persons of inferior social condition. Tradesmen used to be expected to give a C.-B. to the male and female servants of their customers; even messengers and other underling Government servants looked for it from their superiors. The usage led to so much abuse, the recipients becoming clamorous for it as a right, that tradesmen in London and elsewhere put notices in their windows that the payment of a C.-B. had been discontinued; and Government backed them in putting an end to it by discontinuing, at Christmas 1836, the customary gifts. Since then the practice has been on the decrease, but postmen still expect (not in vain) their C.-B.

Christmas Carols, festal chorals or part-songs, still sung in many rural districts of England in celebration of Christmas. (The word 'carol' is the French *carole*, Ital. *carola*, 'a round dance;' probably from Lat. *corolla*.) These songs, while mainly religious, were also at times quite secular in their feeling, as one may see from the 'Wassailers,' 'Boar's Head,' and 'Holly and Ivy' C. C.; but those most popular now are either legendary and narrative, as 'God rest you, merry gentleman,' or filled with a jubilant religious spirit, as the '*In Excelsis Gloria*' (supposed to have been written about 1500), 'Christ was born on Christmas-Day,' 'Hark! all around the welkin rings,' &c. Regarded strictly as songs of joyous thanksgiving and praise commemorative of the birth of the Saviour, the antiquity of the C. C. must reach back to an early period in the history of Christian nations. The most ancient known, however, date from the middle ages, and consist generally of portions of miracle-plays, mysteries, and legends. The earliest English C. C. date from the 15th c.; and they continued to be commonly sung down to the reign of Charles I. The Puritans suppressed them, and all other old Christmas customs, by Act of Parliament; but they came into favour again at the Restoration, after which period a number of free and noisy carols were composed. Since then C. C. have gradually fallen into disuse, except in the remoter country districts. The C. C. belong distinctly to the ballad form of poetry. The 'Carol for St Stephen's Day' is identical in tone and poetical structure with the earliest English and Scotch ballads; and a similar license of incident and expression was claimed by the writers of carols and the contemporary writers of ballads. For example, a number of C. C. have sprung out of a miracle-play, in which Adam, Eve, Herod, and the Duke of Marlborough figure among the *dramatis personæ*. Again, in the carol 'I saw three ships,' the author says, 'O they sailed into Bethlehem,' thus performing a geographical feat equal to Shakespeare's anchoring his fleet in Bohemia. Many of the old C. C., however, are of high merit, and give expression to pure religious feeling in language at once simple and picturesque. Collections of C. C. have been published by Davies Gilbert, Mr Sandys, Dr Rimbault, and Mr Thomas Wright; but the latest and fullest collection is a *A Garland of C. C., Ancient and Modern*, edited by Joshua Sylvester (Lond. J. C. Hotten, 1861).

Christmas Rose. See HELLEBORE.

Christol'ogy is the doctrine of the Church regarding Christ. The two influences which were at work in the Church in the 1st and 2d centuries—the Hebrew and the Greek—gave rise at once to two antagonistic systems of C., that of the Ebionites (q. v.), and that of the Docetæ (q. v.) and Gnostics (q. v.). According to the former, Jesus was a mere man; according to the latter, his body was a mere phantom possessed by a divine being; and the history of C. till the beginning of the middle ages is simply a history of the continual tendency of popular piety to exalt the divine element in his nature.

Before the time of Christ the notion of one supreme deity had undergone some modification. The primal deity had been re-

moved entirely beyond the sphere of human sense, and his intercourse with man was supposed to be carried on, and even the creation of the world to have been effected, by an intermediate *inferior* being. This doctrine prevailed from Greece to China. It was the basis of the Indian religion and philosophy, of Zoroastrianism, Platonism, and the Platonic Judaism of Alexandria. According to the Jewish rabbis, the ordinary medium of intercourse between God and the prophets was the Memra or Divine Word, a name which occurs in the Indian, Persian, Platonic, and Alexandrian systems. The great master of the art of allegorising Scripture was Philo of Alexandria, who, in entire ignorance of Jesus, described the Word (Gr. *logos*) as 'the Son of God the Father,' 'the first-begotten of God,' 'the image and likeness of God,' 'the instrument by whom the world was made,' 'the light of the world,' 'alone able to see God,' 'the shepherd of God's flock,' 'the physician that heals all evil,' &c. In the Epistles of Paul and John, and that to the Hebrews, in the Fourth Gospel, and in the Apologies of Justin Martyr, the same ideas regarding the Word are applied to Jesus of Nazareth. By the middle of the 3d c. this doctrine of the Word, variously understood—the expression 'Son of God' being adopted by Origen—was generally accepted both in the East and in the West; although not without protest from some, hence called Alogists, to whom it appeared that this doctrine of a God of secondary rank incarnate in Jesus was closely akin to Ditheism. To avoid this, therefore, the theory, first propounded by the Shepherd of Hermas (q. v.), that the Son was simply the man Jesus possessed by the Spirit of God, was extended and completed by Sabellius (q. v.), according to whom the three names of Father, Son, and Holy Spirit signified merely three modes of the deity. Another form of the Unitarian protest was typified in the theory of Paul of Samosata, according to whom the Word was, in God and man alike, the principle of thought, by the action of which Jesus became perfectly united to God, and in him God revealed himself to save the human race.

The orthodox doctrine of the Church at the end of the 3d c. was expressed by the Council of Antioch (269), which condemned Paul of Samosata, when, seeking to avoid both Sabellianism and Ditheism, it decreed that the Son was not consubstantial with the Father. But the tendency was still further to glorify Christ. For logically stating the subordination of the Son implied in the decree of the Council of Antioch, Arius was condemned as a heretic by the Council of Nice (325), which at the same time decreed that the Son was consubstantial (Gr. *homoousios*) with the Father, and perfect God. A middle party between the Arians and the orthodox, hence called Semi-Arians, charged the latter with Sabellianism, and adopted themselves the term *homoiousia* (Gr., similarity of substance); but that party triumphed which most exalted Christ, because they were moving with the current of popular sentiment, while the others were striving against it.

But now arose the difficulty of how to adjust the humanity of Jesus to his perfect deity. Apollinaris did not hesitate to say that a god-man was a logical monster, comparable to a minotaur, and held that the *soul* and *body* in Jesus alone were human, while the Word supplied in him the place of the *mind* in other men, and that he had thus in reality only one nature. Apollinaris was condemned by the Council of Constantinople (384), but his ideas survived under the name of Monophysism (q. v). To avoid annihilating either the one nature or the other, theologians were driven now to speak of the two natures as separate. Consequently Nestorius (q. v.) refused to call the Virgin Mary *Mother of God*, because, he said, she could only be the mother of the human nature assumed by the Logos. But popular piety demanded this also; Nestorius was condemned by the Council of Ephesus (431), and with the materials now collected the *Athanasian Creed* (q. v.) was constructed, which contains in its essential points the C. which is held both in the Roman Catholic and Protestant Churches.

At the Reformation the C. of the reformers turned on their theories regarding the Lord's Supper. Luther adopted the view called Communion of Attributes, which amounts to this, that the human nature of Jesus had become a participator in the proper attributes of deity. Calvinism greatly toned down the harshness of the notion of personality as applied to the Trinity, the persons being simply divine attributes, which is very like Sabellianism, and denied that worship should be paid to Christ. The scattered Unitarianism of the 16th c. took the name of Socinianism, and maintained that the doctrine of the Trinity is a patent and crying contradiction in itself, and is besides opposed to the idea of the divine perfection. Arminianism taught what very closely resembled the Arianism of the 3d c. In more recent times there has arisen a feeling of reluctance to pursue C. as a branch of theological speculation. Experience has convinced religious men that it is not a fit subject for precise and dogmatic expression. Yet it cannot be said that there is any visible leaning towards the old Arian or Unitarian view; there seems rather to root itself deeper and deeper in the Christian conscience an indestructible sense of the unique grandeur of Christ's nature, which better accords with the mysterious teaching of the Church than with the Rationalistic protest. See Hagenbach's *Hist. of Doctrine*, Reville's *Deity of Christ*, and Dorner's *History of the Development of the Doctrine of the Person of Christ*.

Chris'tophe, Henri, King of Hayti, born in Grenada, October 6, 1767, of negro parents, and for some time a slave, became in 1793 one of the leaders of the black insurgents against the French, and in 1797 was raised to the rank of brigadier-general by Toussaint-l'Ouverture. In 1802 he defended Cape Town against General Leclerc, who had conducted an expedition from France to regain St Domingo from the blacks. On the death of Dessalines, C. intrigued to succeed him, but Petion, a man of colour, proclaimed a republic at Port-au-Prince. C., however, contrived to have himself proclaimed President of Hayti for life (17th February 1807), and in 1811 he took the title of King as Henri I. He next created a nobility, established a code of laws, encouraged education, and imitated as far as practicable the proceedings of Napoleon. On the death of Petion in 1818, he attempted to unite the S. and W. of the island with the N., but was defeated by General Boyer, the successor of Petion. An insurrection broke out in 1820, and C., deserted by his bodyguard, shot himself, 24th October 1820. He was a man of courage, energy, and considerable accomplishments.

Chris'topher, St (Gr. 'bearer of Christ'), in the tradition of the Church a saint, reputed to be a native of Syria or Palestine, and a martyr, under Decius, in the 3d c. A.D. He is represented as a man of huge size and strength, who did penance for his early sins and personal attendance on the devil by carrying pilgrims across a river. Once, says the legend, he carried over Christ in the form of a little child, who, when he was sinking under his burden, bade him push his staff into the ground, where it changed before the next day into a fruit-bearing palm. This miracle led to numerous conversions. Relics of C. are especially abundant in Spain. Carved and painted representations of him were very common in mediæval churches. He was invoked during plagues, and to drive away the spirits guarding hidden treasures, was assigned tutelage over fishing, and was very popular among the lower classes, who held a figure of St C. to be a preventive of secret dangers. Thus Chaucer's yeoman carried 'a Cristofre on his brest of silver schene.' An Order of St C. was founded in Austria in 1517. The Greek Church holds his festival on the 9th of May; the Roman Catholic, on the 25th of July.

Christopher's, St, or **St Kitt's,** one of the Leeward Islands, called by the natives 'the fertile isle,' was discovered in 1493 by Columbus, who gave it his own Christian name, and colonised in 1623 by the English, who were confirmed in their possession of it by the Treaty of Utrecht (1713). It lies N.W. and S.E., and is about 20 miles in length, with a very unequal breadth. Area, 68 sq. miles; pop. (1871) 28,169. Rugged, sterile mountains of volcanic origin, containing brackish hot springs, traverse the island, culminating in Mount Misery, an exhausted volcano, with a height of 3711 feet. Sugar, rum, and molasses are the staple exports. The revenue of St C. in 1871 was £31,458; expenditure, £26,721; value of total imports, £196,051; exports, £274,080; value of the sugar exported, £219,272. In 1871 there was a public debt of £92,000. The capital is Basseterre (q. v.). In 1866 St George's Church was built here at an expense of £15,000; and on July 31, 1865, a terrific fire took place, in which 1000 houses were destroyed, but fortunately only one life was lost.

Christ's College, Cambridge, into which was merged an earlier college founded by Henry VI., was founded in 1505 by the Lady Margaret, mother of King Henry VII., and enriched by Edward VI., Sir John Finch, Sir Thomas Baines, Mr Chris-

topher Tancred, and others. Its scholarships and fellowships have frequently been increased in value. Among the most celebrated students at C. C. have been Bishop Latimer, Milton, Henry More, Ralph Cudworth, and Archdeacon Paley. The college has the presentation to eighteen livings. The society in 1875 consisted of a master, fifteen fellows, and twenty-nine scholars, twelve of these receiving their title from the founders; the number of undergraduates was 108, and of members on the boards 447.

Christ's Hospital, popularly known as the Blue-Coat School, and situated in Newgate Street, London, is one of the five great hospitals of the metropolis, and was founded on the solicitation of a number of citizens by Edward VI. a few days before his death, for orphans and foundlings, the site of the building being the Old Greyfriars Monastery. Frequent reforms, the chief of which were made by the governors in 1856, have practically converted C. H. from an hospital into a public school for the sons of London freemen and Anglican clergymen; but the picturesque dress—a blue tunic and petticoat, yellow breeches and stockings, red waistband, and a worsted cap, more conspicuous by its absence than its presence—has remained to the present time. Various changes have been introduced into the curriculum and conduct of the school. Although still essentially a classical seminary, the 'modern side'—in the shape of modern languages, literature, &c.—is not neglected. At one time the boys were somewhat harshly dealt with (a graphic account of this is given by Charles Lamb), now they are treated much as other public schoolboys, the only duty savouring of the old charity days being, we believe, the making of their own beds by the boys. The income of C. H. amounts to between £50,000 and £60,000, the original foundation having been enriched by various subsequent ones, particularly that of King Charles II. of £7000. In 1683 a preparatory school was founded for both girls and boys at Hertford, the former, however, remaining there permanently, while the boys go to London when they are old enough. The age of entrance is nine, and of leaving fifteen, although 'King's Boys' (those who attend the mathematical school, founded by Charles II.) and 'Grecians,' *i.e.*, the highest class, eight of whom are sent on scholarships either to Oxford or to Cambridge, remain longer. The building of C. H. has had numerous vicissitudes; it was destroyed in the Great Fire of 1666, and has been twice rebuilt, first by Sir Christopher Wren, and secondly, in 1825, by Mr Shaw. The governors, who have the right of nominating pupils, and are also the patrons of several livings, are at present Her Majesty, the Prince of Wales, the Duke of Edinburgh, the Duke of Connaught, the Mayor and Aldermen of London, twelve members of the Court of Common Council, and about 400 noblemen and gentlemen, who have contributed to the extent of £400 to the benefit of the hospital. In 1875 the average attendance of pupils at C. H. and Hertford schools, including girls, was 1075. There is accommodation at the former for about 800, and at the latter for about 400. The number of masters at the two schools, including lecturers, is about forty. Some very eminent men have received the earlier part of their education at C. H.; among others, Camden, Stillingfleet, Richardson, Coleridge, Charles Lamb, and Leigh Hunt. For interesting accounts of the school, see, among other books, *Annal of C. H. by a Blue* (1867), and *Staunton's Great Schools of England* (1869).

Christ's Thorn. See JUJUBE and PALIURUS.

Chromat'ic passages, in music, are passages proceeding by or containing intervals differing (by a semitone in tempered instruments) from those of the ordinary or diatonic scale of the key in which the passages are written. They are used for the sake of variety or piquancy, or to attain some special effect, and under these circumstances are agreeable; but if employed too often, the ear tires of them, and the music (as is so often the case with Spohr's compositions) loses strength and vigour. The expression *C. scale* is often (incorrectly) applied to a series of consecutive semitones like the notes of the pianoforte.

Chromatic, in optics, opposed to Achromatic (q. v.).

Chromatics, that part of optics which treats of colour. A pencil of sunlight, when passed through a prism, decomposes into a beautiful series of various coloured tints, passing by continuous gradation into each other. Newton believed this series to be composed of seven primary colours, the intermediate shades being produced by the intermixture of two of the primary ones. It was Brewster's opinion, and in this he is supported by Clerk-Maxwell, that there are only three primary colours—red, yellow, and blue. See SPECTRUM ANALYSIS.

The colours of natural bodies are dependent upon their power of absorption for the different coloured rays. Every body, if thin enough, is transparent; hence, if a pencil of light fall upon a body, it penetrates to a certain distance, and naturally a portion of the radiant energy of the light is absorbed and transformed into another kind of energy, probably heat. If blue be absorbed in this way, the body will appear orange; if green, red; and so on. The varied tints of mother-of-pearl are due to reflection from a corrugated surface. See INTERFERENCE, LIGHT, REFLECTION, REFRACTION.

Chrome Alum is the double sulphate of chromium and potassium, analogous in composition to the double sulphate of aluminum and potassium, or alum.

Chrome alum, $Cr_2(SO_4)_3K_2SO_4,24H_2O$
Ordinary alum, $Al_2(SO_4)_3K_2SO_4,24H_2O$

It may be obtained in large violet octahedra by the spontaneous evaporation of its solution, prepared by boiling a solution of bichromate of potash to which oil of vitriol has been added with alcohol, as long as the smell of aldehyde is perceptible. Solution of C. A., if prepared in the cold, is violet coloured, but when heated becomes green, and from this green solution no crystals separate; on standing for some weeks, however, the green solution becomes violet, and deposits the salt.

Chrome Green (the sesquioxide of chromium) is a beautiful dark-green pigment used in painting porcelain and as an ingredient in green glass and enamel.

Chrome Red (a basic chromate of lead), of various shades of red and orange, is used in calico-printing and the arts generally.

Chrome Yellow (chromate of lead) is most useful in the arts, and exhibits distinct shades according to the mode of its preparation, known as *lemon yellow*, *Paris yellow*, *Leipsic yellow*, &c.

Chro'mium is a metal, and was discovered in 1797 by Vauquelin in a Siberian mineral, called by mineralogists *red-lead*,—a compound of C. with lead and oxygen. C. derives its name from the fact that its compounds are coloured (Gr. *chroma*, 'colour'). Its most abundant ore is *chrome iron*, a compound of its oxide with oxide of iron. The colours of *emerald*, *olivine*, *serpentine*, *spinelle*, &c., are due to its presence. Metallic C. may be obtained by subjecting a mixture of its oxide and charcoal to an intense white heat. It is steel-grey in colour, brittle, and after having been fused, is so hard that it will scratch glass. Its atomic weight is 52·4, and the symbol for its atom Cr. Bichromate of potash is the most important compound of C., and from it all other derivatives of the metal are prepared. It is manufactured for commercial purposes by strongly heating chrome iron (previously reduced to a fine powder) with a mixture of carbonate of potash and nitre, in a reverberatory furnace. After a sufficiently long fusion the resulting mass is broken up and treated with boiling water, when chromate of potash (K_2CrO_4) is dissolved out. In order to convert the chromate into bichromate, the solution of the former is mixed with acetic acid, and the whole evaporated to the crystallising point, when the bichromate separates in large prisms, having a beautiful orange-red colour, whilst acetate of potash remains in solution.



$$\underbrace{2K_2CrO_4}_{\text{Chromate of potash.}} + \underbrace{2C_2H_3O(OH)}_{\text{Acetic acid.}} = \underbrace{K_2Cr_2O_7}_{\text{Bichromate of potash.}} + \underbrace{2C_2H_3O(OK)}_{\text{Acetate of potash.}} + \underbrace{H_2O}_{\text{Water.}}$$

Chro'motism, or Chromism, a disease of plants consisting of an unnatural colouring of leaves, such as when they become red, variegated, &c.

Chro'motype. Under this name Mr Robert Hunt published in 1843 a photographic process, in which a solution of sulphate of copper and bichromate of potash is employed to prepare a sensitive surface, nitrate of silver to develop the picture, and washing in water to fix it. The process never had any great success, but it is recommended as yielding excellent results in copying botanical specimens and engravings.

Chron'icle (Fr. *chronique*, Lat. *chronica*, from Gr. *chronos*, 'time'), a form of history in which events are narrated simply

according to their sequence in time. Chronicles exist both in prose and rhyme. Much of early European history is preserved in this shape. For our own country, the most valuable record of this kind is the old English *C.*, commencing with the Christian era, or rather with the invasion of Britain by Julius Cæsar, and reaching down to the accession of Henry II.

Chron'ogram, or Chron'ograph (Gr. *chronos*, 'time,' and *gramma*, 'a letter,' or *graphein*, 'to write'), a device by which a date is expressed by certain letters of an inscription being printed in a larger type than the others. In the C.—

GEORGIVs DVX BVCKINGAMIÆ,

from the name of George, Duke of Buckingham, the date, MDCXVVVIII. (1628), is that of the year of his assassination by Felton. The close of the Seven Years' War is thus finely expressed—

Aspera beLLa sILent: reDIIt bona gratIa paCIs;
O sI parta foret seMper In orbe qVIes,

which gives the year 1763. An anagram was sometimes united with a C., as in this on General Monk—

GeorgiVs MonCe DVx de AumarLe,

which is intended to be read thus—

Ego Regem reduxi, Ano. Sa. MDCLVV.

Chron'ograph, an instrument for registering very small intervals of time. The principle upon which all such instruments depend is that of uniform motion. A graduated dial-plate or cylinder is made to rotate uniformly under the action of clock-work, and a mark or dot is made at the instant of occurrence of any phenomenon. The permanent mark is made either by the observer himself, as in Benson's race-C. and in Strange's astronomical C., or by the action of electric currents and electro-magnets. To this latter class belong the chronographs of Navez, Boulengé, Leurs, Noble, and Bashforth, whose work on the *Motion of Projectiles* gives descriptions of two of his instruments, and accounts of interesting experiments upon the velocities of bullets. See also Owen's *Modern Artillery* (1871).

Chronol'ogy is the science of the measurement of time. That part of it which treats of the units of time as regulated by the heavenly bodies is properly Theoretical or Mathematical C.; that which treats of the methods adopted by different nations of dividing these units into smaller, and uniting them into longer periods of time is Technical or Applied C., and that which treats of the lapse of time in the history of nations is Historical C. The principal parts of the first two of these divisions will be found discussed under HOUR, DAY, WEEK, MONTH, YEAR, &c.; only the last can be briefly noticed here.

To fix the *date* of an event is to tell how long ago it happened. This is done by counting the time, measured by years, &c., from some *epoch*, that is, a point of time marked by some very striking event. A long period of time, which is measured by events in it being reckoned from a certain epoch, is called an *era*. Thus all Christendom reckons its time from the birth of Christ, and the period from that epoch to the present time is the Christian era. The Greeks reckoned from the first Olympiad at which the victor's name was recorded, *i.e.*, 776 B.C.; the Romans from the foundation of Rome, 753 B.C.; the Mohammedans from the flight of Mohammed, 622 A.D. The Egyptians, Hindus, Chinese, Assyrians, Babylonians, Persians, &c., all had their systems of C. The Hebrew system has always been regarded by Christians, who hold the Hebrew Scriptures to be inspired, as the most important, because by it the age of the world and of mankind is supposed to be fixed. According to Hebrew C., which is counted almost entirely by lives of men, from the Creation to the Deluge (q. v.) was 1656 years, from the Deluge to the birth of Christ, 2348. In modern times the science of geology has shown this 6000 years to be too short for the age of the world and of man; and authentic records of the Egyptians and Assyrians have shown the time allowed from the Deluge to be too short. Accordingly various plans have been adopted for allowing more time, without imperilling the infallibility of Scripture. The latest chronologers, on this principle, taking into account the variations of the LXX., &c., fix the Deluge at B.C. 3099, or 3159, and the creation of Adam about B.C. 5361, or 5421.

Chronom'eter (Gr. *chronos*, 'time,' and *metron*, 'a measure'), the name usually given to an instrument, constructed upon the same principle as a watch, but much more delicate and trustworthy, the irregularities arising from changes of temperature and other external influences being as far as possible compensated for. The C. is indispensable for the determination of longitude at sea. See HOROLOGY.

Chron'oscope (Gr. *chronos*, 'time,' and *scopos*, a 'mark'), one of the many inventions of Sir Charles Wheatstone, is an instrument which is capable of measuring the duration of short-lived flames, and of showing discontinuities in certain luminous streaks. A mirror is made to move rapidly in such a manner that the reflection of a continuous flame would be a complete circle, that of a flame of short duration a greater or less arc, that of an instantaneous flash a point, and that of a discontinuous flame a succession of points. The electric spark is found by this means to be instantaneous.

Chru'dim, a walled town of Bohemia, on the Chrudimka, about 62 miles S.E. of Prague, with a splendid collegiate church, a Capuchin convent, and a high school. Cloth is manufactured, and there are great horse markets. Pop. (1870) 9446.

Chrys'alis (Gr. *chrysallis*, 'the gold-coloured sheath of butterflies'), the name popularly applied to the second or pupa stage in the metamorphosis of insects, and more notably to those pupæ which exhibited golden spots or lustres. There are infinite variations, not only in the coloration, but in the general form and attachments of chrysalids, and for fuller information the reader may consult the articles INSECT, TRANSFORMATION, METAMORPHOSIS, BUTTERFLY, MOTH, &c.

Chrysan'themum (Gr *chrysos*, 'gold,' and *anthemon* = *anthos*, 'a flower'), a genus of Herbaceous or somewhat shrubby plants, belonging to the natural order *Compositæ*, chiefly natives of the temperate parts of the Old World. There are only two native species in Britain, *C. leucanthemum*, the ox-eye daisy, and *C. segetum*, the corn-marigold, the former having a white flower with a yellow disc, the latter a bright yellow flower, often very common in corn-fields. Many foreign species have been long cultivated in our gardens, but the flower popularly known as the C. is *Pyrethrum Sinense*.

Chryselephan'tine. See STATUARY.

Chrysipp'us, an ancient Greek philosopher, born in Cilicia B.C. 280. After losing his property, he attached himself to the Stoic lecturer Cleanthes, became the head of the Porch, and attacked with great spirit and a keen logic Epicureans, Academicians and Aristotelians. It is said that he was for a time converted to scepticism by Arcesilaus, and then composed his work on Custom. Undoubtedly C. was more accurate than his predecessors, tracing the Cataleptic Phantasm (or true perception) to repeated and intense modifications of the soul, and taking as the principle of duty the nature of man, and not of the universe. The latter view he carried into great detail, insisting on the duty of preserving health and of acquiring riches, while still condemning most of the emotions to eradication. C., who was said to have written 700 books, discoursed on the education of children. In logic his name is connected with the elaboration of the *Sorites*. In physics he adopted the usual optimist theory of the Stoics based on a passive matter and an active reason. Only fragments of his numerous writings remain. See Petersen's *Philosophiæ Chrysippeæ Fundamenta* (Hamb. 1827).

Chrys'is (Gr. 'golden'), a genus of Hymenopterous insects, including those forms popularly known as 'ruby-tailed' flies. The *C. ignita*, or 'ruby-tail' of this country, is the most familiar species. These insects belong to the tribe *Tubulifera* of the Hymenopterous order, and are generally found on walls, palings, sandbanks, and like situations. The larvæ of C. attack bees in their hives.

Chrysobalana'ceæ, a family of Dicotyledons allied to the order *Rosaceæ*, of which order, indeed, it is sometimes looked upon as only a subdivision. There are nearly 100 species—all trees or shrubs—natives of the tropics of the Old and New Worlds, though more abundant in the latter. Of the twelve genera described, *Chrysobalanus*, *Couepia*, *Prinsepia*, and *Hirtella* may be taken as examples of the best known.

Chrysobalanus, a genus of plants of the natural order *Chrysobalanaceæ* containing four species, natives of the tropical parts of Africa and of America. One of the most common species is the cocoa-plum (*C. Icaco*), which in the W. Indies

forms a favourite conserve with the Spanish colonists, especially in Cuba. The kernels yield a fixed oil, and when made into an emulsion they are said to be useful in dysentery. An astringent bath, useful in leucorrhœa and blennorrhœa, is prepared from the leaves and roots.

Chrys'oberyl (Gr. *chrysos*, 'gold,' and *beryllos*, a 'gem'), a transparent or translucent gem of great hardness, composed of alumina and glucina, coloured various tints of pale green by protoxide of iron, and sometimes with a bluish-white opalescence internally. When cut in facets, it exhibits a resplendent lustre almost equal to the yellow diamond. The opalescent variety shows best *en cabochon*, that is, with a convex surface. The C. is chiefly found in alluvial deposits of rivers of Brazil and Ceylon; it also occurs in granite of the Mourne Mountains, in Ireland, and a variety called *Alexandrite*, after Czar Alexander I., is obtained from mica-schist in the Ural Mountains.

Chrysochlo'ris, a genus of Insectivorous mammalia represented by the *C. holosericea* or *aureus*, or golden mole of S. Africa. The C. resembles the Common Mole (q. v.) in form, but is somewhat less in size. Its peculiarity consists in the iridescence of its fur; the beautiful play of metallic tints and lustres exhibited by this form procuring for it its names of golden, changeable, or shining mole. The *setæ* or bristles of the *Aphrodite* or sea-mouse amongst the worms or *Annelida* (q. v.) exhibit the same iridescent lines. The front feet have four toes, and the hinder ones are five-toed. No outer ears or tail are developed. The teeth of both jaws fit exactly into each other, and the food consists of insects and worms.

Chrysocoll'a, an impure hydrous silicate of copper of a green or bluish-green colour, found associated with copper ores. C. means 'golden glue,' an allusion to its resinous lustre and transparent edges.

Chrys'olite (Gr. *chrysos*, 'gold,' and *lithos*, 'a stone'). Transparent greenish-yellow crystals of olivine are so called. They are seldom an inch long, and are little used in jewellery on account of their brittleness. The best stones are brought from the Levant. *Peridot*, which, like the C., is a silicate of magnesia coloured by protoxide of iron, is sometimes used synonymously with it; but peridot is much softer, and of a yellowish-green colour.

Chrysolo'ras, Manuel, one of the scholars who promoted the great revival of learning, was born of noble family, at Byzantium, about 1350. He was sent, probably in 1389, by Joannes Palæologus, the Byzantine emperor, to France, Italy, and England to solicit aid against the Turks. Though his embassy was not successful, C. made many friends in the W., and in 1397 he settled, as teacher of Greek literature, at Florence, where he attracted numerous audiences, and had among his pupils Aretino, Guarini, Leonardo Bruni, Poggio, and Filelfo. He taught also at Milan, Pavia, and Rome, where he won the esteem of the Pope, who intrusted him with a mission to the Emperor Sigismund. He died 15th April 1415 at Constance, whither he had gone in 1413 to represent the Greek Church at the Council held there. C. is the author of numerous works which exist in MS. in the different libraries of Italy. Only two have been printed, the *Erotemata* (1488), a Greek grammar, 'the first, and long the only channel to a knowledge of that language, save oral instruction' (Hallam's *Intr. to Lit. of Europe*, ch. i.); and *Epistolæ tres de Comparatione veteris et novæ Romæ* (Par. 1655). See Van der Hardt's *Memoria Chrysoloræ* (Helmst. 1718).

Chrysomelæ. See GOLDEN BEETLE.

Chrysophyll'um. See SAPOTACEÆ, MONESIA BARK, and STAR APPLE.

Chrys'oprase (Gr. *chrysos*, 'gold,' and *prasinos*, 'leek-green'), a variety of chalcedony, of an apple or leek-green colour, due to the presence of oxide of nickel. It is found in Lower Silesia, and in different localities in the U.S., and although made into brooches, bracelets, seals, &c., it is not held in great esteem by jewellers. The chrysoberyl of the ancients is supposed to have been C.

Chrys'ops. See CLEG.

Chrysosple'nium, a genus of Saxifrages. *C. oppositifolum* and *alternifolum* are two common British species, the former being, however, rather more generally distributed than the latter.

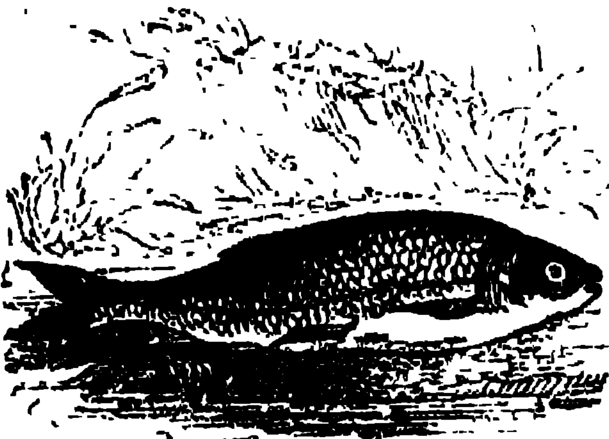
There are various other species scattered over the world, but none of any great beauty. In the Vosges they are used as a salad under the name of *cresson de roche* (rock cress).

Chrys'ostom, Joannes, Archbishop of Constantinople, and the most eloquent of the Christian Fathers (hence his name, Gr. *Chrysostomos*, 'golden-mouthed'), was born at Antioch in 347. His father Secundus, imperial general in Syria, died shortly after C.'s birth, but his pious mother Anthusa, who had been left a widow at the age of twenty, procured for him the best teachers in all the branches of learning. At first intended for the law, he studied rhetoric under the great pagan Libanius, who said, with bitterness on his deathbed, 'I would have left the care of my school to Joannes, but the Christians have snatched him from me.' After remaining three years with Bishop Meletius, he was induced to receive Christian baptism, abandon his profession, and enter the Church. He then spent six years of ascetic seclusion in the mountains of Antioch, engaged in a profound study of the Scriptures under the abbot Diodorus (afterwards Bishop of Tarsus), and having for companions Basil (St), Gregory (Nazianzen), and Theodore (of Mopsuestia). Worn out with austerities, he returned to Antioch, and was ordained a deacon by Meletius in 381, and a priest by Flavianus in 386. For twelve years he preached at Antioch, delivering an immense number of sermons, orations, and homilies. Eutropius, the minister of the Emperor Arcadius, had heard the great preacher, and now inveigled him to Constantinople, much against his will, to fill the vacant archbishopric. But his life was too austere, his discipline too strict, and his denunciation of every kind of profligacy and error too faithful for that corrupt metropolis: the lax clergy (headed by Theophilus, Patriarch of Alexandria), many courtiers, and the Empress Eudoxia, combined against him, got him condemned by a packed synod (403). The charges brought against him were clandestine intercourse with females, secret intemperance, inhospitality, violence towards his own clergy to the extent of striking them, reckless dissipation of the wealth of his church, impious and arbitrary acts, infractions of canonical laws, toleration of pagans (whom he too easily admitted to baptism), and an attachment to the doctrines of Origen. That C. indignantly repelled such of these accusations as were dishonourable mattered nothing. The forty-five bishops were bent on his ruin, and they succeeded. C. was banished. When the populace of Constantinople heard the news they were stirred with fierce indignation. It was thought prudent to bring the great preacher back from his exile at Prinetos, in the Gulf of Nicomedia. But only a few months later he burst forth in church with a stern denunciation of the excesses that had marked the games held in honour of the empress. Eudoxia was furious. A council was again held at Constantinople, and the previous condemnation was confirmed. It was in vain that C. appealed to the Pope. Rome was helpless. The Goth was almost at her gates. On the 20th of June C. was carried off from his see by an armed force. His residence was fixed at Cucusus, in Armenia; but when his indefatigable pen, and the fame of his apostolic virtues, made him as powerful in adversity as on his episcopal throne, Arcadius ordered him to be transported to the remotest limits of the empire, under the shadow of Caucasus. On the way thither he sank under the fatigue of the journey made on foot, the heat, and rough treatment from his guard; and died at Comanum, in Pontus, 14th September 407. C. is one of the heroes of the Church. His virtues are noble and exalted. It is easy to understand why mean, worldly, and vicious natures hated him. His character was a living and perpetual reproach to them. It is no less easy to understand why he fell before his enemies. He was outspoken, unguarded, perhaps we may even say ungovernable, in his speech. In his transports of Christian indignation he was reckless of consequences, and uttered words that Pride and Vice could never forgive. But this sacred passion for reforming the manners of his age has given an immortal vitality to his writings. No father of the Eastern Church has thrown so much genius, so much humanity, so much of his own age into his works, which form a part of Byzantine history during one of its most momentous transitions. They embrace homilies, sermons, commentaries, and epistles. Of the complete editions we may note that of H. Savile (8 vols. Eton, 1612); and of Montfaucon and the Benedictines (13 vols. 1718–38). See also the splendid *Apologia* of Villemain in his book, *Sur l'Élo-*

rience Chrétienne au quatrième Siècle (2d ed. 1849). See also Neander's *Kirchengeschichte* (Bohn's transl. vol. iv. pp. 466–477), and also his monograph, *Johann C.* (3d ed. 2 vols. Berl. 1848).

Chrys'otype (Gr. *chrysos*, 'gold,' and *typos*, 'impression'), a photographic process invented by Sir J. F. Herschel, and one among the many modes of directly receiving the impression upon paper. The paper is prepared by immersion in a ferric salt, which is reduced by the action of light to a ferrous salt. Upon the reduced portions metallic gold is then precipitated, and the picture fixed by several washings in water and in a weak solution of potassic iodide.

Chub (*Leuciscus cephalus*), a Teleostean fish, included in the family *Cyprinidæ*, or Carps, and found in most English and southern Scotch rivers. The average weight is about five pounds. It is coloured of a bluish-black on the upper parts, and silvery-white beneath. The sides of the head and gill-covers are yellow. It also occurs in European rivers, and spawns in April and May. The flesh is somewhat coarse, and hence the C. is not esteemed as a table-fish. The food consists of worms and insects; and the C. may be caught by means of insect-bait—real or artificial. The flesh is most seasonable in June or July. The scales used to be employed, like those of the dace and bleak, in inlaying-work, and in manufacturing artificial pearls.


Chub.

Chubb, Thomas, one of the English Deists of the first half of the 18th c., was born at East Harnham, near Salisbury, 29th September 1679. First a glover, then a chandler in Salisbury, he was essentially an illiterate man, but had a mind which was fascinated by the theological controversy then raging, and he acquired facility in writing by making notes and observations on the deistical writings which were eagerly read by him. He produced a multitude of tracts similar to the writings of the time on the same side. C. died at Salisbury, 8th February 1747. His posthumous works were published in 2 vols. 1748.

Chuck-Will's-Widow (*Caprimulgus* or *Antrostomus Carolinensis*), a Fissirostral bird, belonging to the order *Insessores*, and to the family *Caprimulgidæ* or Goatsuckers. This name is applied to it from its peculiar cry. It inhabits the southern regions of the U.S. of America, and is allied to the Whip-poor-will (q. v.).

Chucui'to, a town of Peru, province of Puno, on the W. shore of Lake Titicaaca, 15 miles S.E. of Puno, was a flourishing place till the 18th c., when it is said to have had a pop. of 300,000, which has now dwindled to 5000.

Chumbul', a river of India, rises in the Vindhya range, and in the Malwa agency, flows N. and N.E. through a region of wild beauty, and joins the Jumna 90 miles S.E. of Agra, after a course of 570 miles. It has a rapid current, and receives many affluents, of which the chief are the Kally Sind, Parbutti, and Bumnass.

Chu'nam, the Indian name for lime obtained by calcining sea-shells, as well as for mortar or plaster prepared from it. The walls of houses in Madras usually receive three coats of plaster, the two first being composed of lime and fine river-sand, and the third of lime mixed with 'jaggery' (palm-sugar), and moistened with a strong infusion of cocoa-nut husks. When polished with rock-crystal rubbers, and stained, the plaster resembles the finest marble, and indeed almost equals it in durability.

Chunar', or **Chunargurh**, a town in the district of Mirzapore, N.W. Provinces, British India, on the Ganges, 16 miles S.W. of Benares. It has a strong fortress, overlooking the native town, and containing an old palace, an excavated well, a hospital, a prison, &c. C. is accessible to vessels of 60 tons. Pop. (1872) 10,125.

Chuquisa'ca, also **Sucré**, formerly **Charcas** or **La Plata**, the capital of Bolivia, S. America, on the Chachimayo, in a sheltered plain 9000 feet above the sea. It is the seat of the government and of an archbishop, has a cathedral and twenty-six other churches, a palace, the University of St Xavier, a hospital, and a military academy. Pop. (1858) 23,979. C. was founded by the Spaniards in 1538, on the site of the native *Choqua Chaka* (*i.e.*, 'Bridge of Gold'), and received the name of La Plata from being near to the silver mines of Porco. Sucré, its latest name, was that of a general in the war of Bolivian independence. The *province* of C. contains rich silver mines and splendid antiquities, and has an area of 30,135 sq. miles, and a pop. (1858) of 223,668.

Church. It has been suggested that the word C., in Old Eng. *circ*, *cyrc*, or *cyrice*, is the Latin *circus*, and that it was first applied to the stone circle or Druidical temple of the Britons, and afterwards transferred to the Christian building. But this would leave unexplained the occurrence of the word in the other Teutonic tongues—*e.g.*, Dutch *kerk*; Ger. *kirche*. It is therefore more probable that the origin of the word is the Gr. *kuriake*, 'the Lord's house;' though it is still sufficiently perplexing to understand how a nation like the English, who got their religion from Rome, should not have adopted the Roman name for a C. Perhaps Theodore of Tarsus, Archbishop of Canterbury, himself an Eastern by birth, may have had something to do with it. Its use among the other Teutonic races is more easily explained through the influence of Ulfilas (q. v.) and the Mœso-Goths. C. is the word used in the English version of the New Testament to translate the Greek *ekklēsia*, except when the latter occurs in its original civil sense (a number of people called together from among others), in which case 'assembly' is employed (Acts xix. 32). It was applied to the Jews, as the worshippers of Jehovah called from among the heathen (Acts vii. 38), and also, among them, to a congregation of worshippers (Ps. xxii. 22; *cf.* Heb. ii. 12). As used by Christians, it has several shades of meaning:—1. An assembly of Christians who meet for worship in a particular place (Rom. xvi. 5). 2. The collective Christians in a certain place, or as it were a national C. (Acts xi. 22, 26). 3. The whole body of Christian people, of all times and of all places, understood as called out from the whole body of mankind. 4. The idea of C., as a building, which is not found in the New Testament, unless it be in Matt. xvi. 18, but in the 4th c. the word had come to be generally used in that sense.

1. The C. in its widest sense (3, above) is divided into the Visible C. and the Invisible C., but there are different theories as to what is meant by these terms respectively. (1.) Thus according to Romanists and High Churchmen the Visible C. is a theocracy or an externally organised society, all born within its pale being *ipso facto* its members, 'professing the same faith, united in the communion of the same sacraments, subject to lawful pastors.' The Invisible C., according to this theory, is the body of Christians who have at any time departed out of this world in the faith and love of God, all saints being included, however, who lived in the world even before the coming of Christ, 'so believing that he would come,' but all persons being excluded who have died in a state of unforgiven sin, that is, not in communion with the C. (2.) The common Protestant theory is that the C., as such, is not an external organisation, but a body the members of which are all true believers, no matter to what ecclesiastical organisation they may belong; the one condition of membership in which is faith in Jesus Christ; and the attributes, prerogatives, and promises of which, therefore, belong to the true people of God collectively considered. (3.) According to certain Puritan sects the Visible C. consists of the regenerate, and it is its prerogative and duty to sit in judgment on the question, whether the applicant for admission is truly born of God. According to both the last two theories the Invisible C. consists of the elect.

2. C., like the Gr. *kyriakē*, and Lat. *dominicum*, has also the meaning of the Lord's house, or the building in which Christians meet for worship. Originally they were oblong, standing E. and W., with chambers for the clergy on both sides, and two doors in the W. end as separate entrances for men and women. They afterwards came to be built in various shapes—round, square, and especially in the form of a cross, sometimes with the eastern division inclined off the straight line towards the S., to indicate, it is said, the drooping of the Saviour's head upon the cross. All had an Apse (q. v.) borrowed from the Roman *basilica*. The threefold division lengthwise, of nave, choir, and sanctuary, is derived from the Jewish temple, with its court of the Gentiles, holy place, and holy of holies. There is also properly a threefold division latterly, formed by the nave and the

aisles, and a triple elevation, the base-arcade, triforium, and clerestory. Churches are distinguished into various grades:—*Cathedral*, which contain a bishop's cathedra or throne; *collegiate*, served by a dean and chapter; *conventual* or minster, if connected with a convent or monastery; *abbey* or *priory*, if governed by an abbot or prior; *parochial*, if furnished with a font. See Walcott's *Sacred Archæology* (1868), and Hodge's *Systematic Theology* (1873).

Church Dis'cipline. From the earliest times the principle was maintained in the Church that those who had violated their baptismal vows by scandalous transgressions should be excluded from participating in the Communion, and should not be again admitted to it till they had given satisfactory proofs of repentance. When this was done they were again admitted to the standing of Catechumens (q. v.), being divided into the same classes. Their penitence having thus been satisfactorily proved, they received absolution and benediction before the congregation, and were restored to the fellowship of the Church. This was the first form of Penance (q. v.) which the Church of Rome systematised, in connection with the Confession (q. v.) for all kinds of sins, even the most secret. But nowhere was C. D. more consistently and rigorously carried out than at Geneva under Calvin, and nowhere has it lingered longer, in anything like its original form, than in the Calvinistic Churches of Scotland. See EXCOMMUNICATION.

Church Gov'ernment. All Christians are agreed that there are certain rules for the organisation of the Church laid down in the Scriptures which are of universal and perpetual obligation; but at the same time all Churches have exercised a certain discretion in modifying their organisation to suit varying emergencies. The chief systems of C. G. are the Episcopalian (q. v.), the Presbyterian (q. v.), and the Independent (q. v.). The first is that in which various grades among the clergy are held to be of divine institution because existing from apostolic times, and which is carried to its utmost limit in the Roman Catholic Church. In the second, all the clergy are held to be on an equality, the Church being ruled by certain courts. The Independents hold that there ought to be no such organised unity among congregations as to interfere with their perfect independence of each other.

Church History is usually divided into *external* and *internal*. The former, which is C. H. proper, would at first be synonymous with a history of the propagation of Christianity, and would always be concerned chiefly with the relation of Christianity to the civil and religious state of the countries in which it was propagated, on which the fate of the Church would depend. The latter, which is properly the history of the Christian religion, is concerned chiefly with the doctrine and government of the Church. The first Church historian was Eusebius (261–340, q. v.), who wrote a history of the Church, 'from the very origin of the dispensation of our Lord,' to the accession of Constantine as sole emperor (324). It is generally supposed that he had sufficient materials in previous writings to enable him to give an authentic account of the Church during the period between apostolic times, and his own, for which he is the sole authority. He himself seems to have relied upon something like inspiration, for he acknowledges that his materials were next to none. In the preface to his work he says, 'Looking up with prayer to God as our guide, we trust indeed that we shall have the power of Christ as our aid, though we are utterly unable to find the bare vestiges of those who may have travelled the way before us.' His work was continued by Theodoret (q. v.) down to 429. The next who wrote was Socrates (q. v.), whose C. H. extended from the accession of Constantine (306) to 439. Sozomen (5th c.) wrote a history of the same period as the last two. Next Philostorgius (born 358), an Arian, wrote a history of Arianism from about 300 to 425. Evagrius wrote a C. H. of the period from 431 to 594. Sulpicius Severus (end of the 4th c.) wrote a sacred history from the Creation to 400 A.D. These are the chief writers of C. H. proper near the fountain-head, from whom the legion of later writers must all derive their materials. For a history of doctrines, which is a branch of C. H., of rites and ceremonies, and of some other matters connected with it, much information is also to be found in the numerous and voluminous writings of the early Christian Fathers. On the rise of separate states in Western Europe, after the dismemberment of the Roman Empire, each country in due time produced its roll of Church historians, of whom the most interesting and important for Englishmen is the Venerable Bede (q. v.). Since the Reformation C. H. has been written from the Roman Catholic and Protestant points of view by many erudite and able scholars. Others, again, like Neander in Germany and Milman in England, have sought to exhibit the historical development of the Christian Church without any polemical bias. A full account of all the writers of C. H. up to the middle of the 18th c. will be found in Walch's *Bibliotheca Theologica Selecta*; of more recent ones in Lowndes' *British Librarian*.

Church Rates, in England, constitutes a tax on the parishioners to defray the expense of upholding and repairing a church and its appurtenances. The rate was imposed by the parishioners, convened by the Churchwardens (q. v.), and the vote of the majority was binding on the whole. There is no law which obliges the parishioners to provide C. R., consequently when Dissent is in a majority, or even possesses a strong minority, there is often no fund to repair churches—many have consequently become ruinous. The levying of C. R., and questions in connection with so doing, was long a source of animosity in England; but by the Act of 1868 compulsory payment has been abolished. Voluntary contributions and bequests, for the ecclesiastical purposes of the parish, are, under the Act, now administered by a body of Church trustees. Those who do not contribute are by the statute disqualified from interfering with the administration of the funds raised as C. R.

Churchwardens, in England, are ecclesiastical officers whose function it is to take care of the edifice of the church, and all that belongs to it. They are also expected to take cognisance of the behaviour of the congregation in all matters within ecclesiastical jurisdiction. They are chosen annually on 28th March, or within fourteen days after, either by the clergyman or by the parish, or by both together. Every churchwarden is *ex officio* an overseer of the poor.

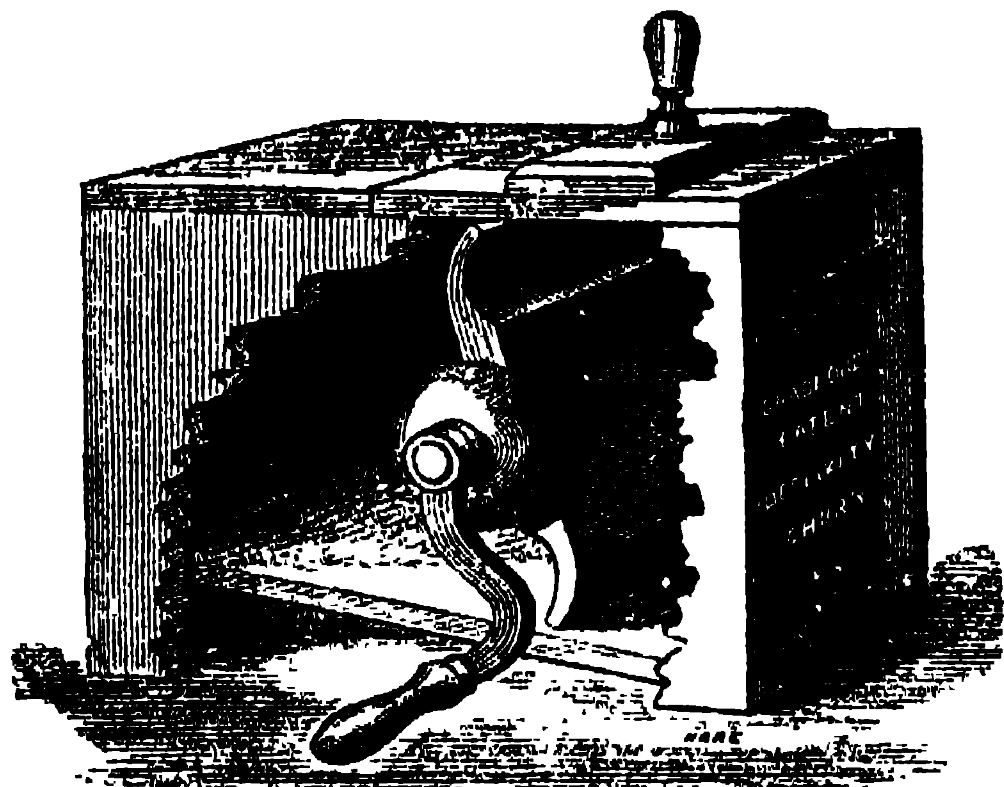
Church'yard. In England a C. has been legally described by Sir William Scott as 'a consecrated place, entitled to public protection, and in which nothing should be done but under the direction of public authority.' In Scotland, there is no rite of *consecration* either according to civil or ecclesiastical laws; but the C. is entitled to legal protection. See BURIAL.

Churchill, Charles, an English satirist, whose profligacy has perhaps hindered justice from being done to his genius, was born at Westminster in February 1731, and educated at Westminster School, where he neglected his studies, and contracted a clandestine marriage in his eighteenth year. In 1756 he took holy orders, and in 1758 succeeded his father as curate of St John's, Westminster. In 1761 he published anonymously the *Rosciad*, a clever satire on actors and theatrical managers, which took London by storm. 'The noise in the theatrical world was like that caused by the report of a gun in a rookery. The actors ran about the town, spreading their own grievances, and the satirist's name at the same time' (Hannay). Now avowing the authorship, he published in rapid succession *The Apology* (addressed to the writers of the *Critical Review*), *Night* (which is an excuse for his vices), *The Ghost*, and other satires. Meanwhile he had been living so dissipated a life that he had to resign his curacy. His health failed, and he died at Boulogne on a visit to Wilkes, of whom he was a warm partisan, November 4, 1764. C. was once known as the British Juvenal, and even yet, all who can forget the man and look only at his works must admit him to be a true poet. See Bell and Daldy's edition of his poetical works (1867), with a Memoir by James Hannay.

Churching of Women, or *Thanksgiving after Childbirth*, is a usage of the early Church, borrowed from the Jewish rite of purification (Lev. xii.), still retained as compulsory in the Roman Catholic and Greek Churches, and for which there is also a service in the Liturgy of the Church of England

Churn (Old Eng. *cyrn*, from *cerran*, 'to turn;' Low. Sc. *kirn*), an implement for preparing butter from cream or milk. For the separation of the fatty particles which form butter, it is necessary that the minute sacs in which the fat is enclosed should be ruptured, and this is accomplished by violent agitation or 'turning' about of the fluid in a C. The object of churning is therefore to enable the solid fat to come together in

the masses which constitute butter. A great many plans for the construction of churns have been adopted, and as the operation they have to perform is simple, they are all more or less efficient. The chief aim in the construction of the C. is to save time and labour, and to separate the butter completely. The most common form of the C. is the upright plunger, which consists of a long narrow tube or cylinder of cooper-work, tapering gently upwards, with a movable cover on the top. Through the centre of this cover the staff of the plunger is made to work piston-wise, at the lower extremity of which the agitator is secured. The agitator consists of a reticulated framework of wood, of a diameter sufficient to work easily within the C. Another common form is the Box-C., which consists of a box of birch or plain wood very carefully jointed, having an agitator formed of four radial arms joined by cross bars, which is worked by a winch-handle. Some churns



Churn.

have a reciprocating motion, and others a seesaw or cradle motion, but they are little used. The atmospheric C. is a form which has recently come into favour. Its peculiarity consists in an arrangement by which air is introduced into the fluid, and by its bubbling out causes a very effective agitation. It is said to save considerable time and labour, while at the same time it thoroughly separates the butter. A form of C. recently patented by Messrs T. Bradford & Co. is seen in the fig. It is known as the 'Declivity C.,' and its peculiarity consists in the bottom sloping downwards at an angle of about 30°, so that while the concave side of the agitator dashes the cream upwards, the fluid is constantly running downwards, and thereby a powerful concussive stroke is produced.

Churr'us. See HEMP.

Chusan', the principal island in a small group off the E. coast of China, 45 miles N.E. of Ningpo, is about 18 miles long and 10 broad, and 50 miles in circumference. It is mostly mountainous, but is intersected by cultivated valleys, yielding tea, rice, wheat, sweet potatoes, cotton, tobacco, chestnuts, &c., and growing bamboo, camphor, and tallow-trees. Ting-hai, the capital, is surrounded by walls, and has a fine Buddhist temple. C., called 'the key of China,' was taken in 1840 by the British, who evacuated after eight months' occupation, but again seized it in October 1841, and held it till the end of the Chinese war. It was again taken by them in 1860, but was ceded to China by the convention of Pekin. The sacred island of Pu-tu is the next in importance of the group to which C. gives name. It is inhabited solely by Bonzes and others of the religious class, and contains many fine pagodas and Buddhist temples.

Chut'ney, a condiment of Indian origin used with meat, game, fish, and animal food generally. The basis of the preparation is an acid or sub-acid fruit, to which spices and flavouring ingredients are added. The fruit most usually employed as a basis of C. is the mango, and numerous varieties are prepared for use, the recipes for which vary. The banana is also used in the preparation of C.

Chyle (Gr. *chylos*, 'a juice,' from *cheō*, 'to be fluid'), the name given to the matter absorbed by the lacteals in the villi of the small intestine. It is found in two conditions—first, before, and second, after it has passed through the mesenteric glands. To the naked eye, in both conditions it presents much the same appearance; but when examined under a magnifying power of 250 diameters, it is found to present a marked difference. Before passing to the mesenteric glands it consists of a fluid in which there are multitudes of very small molecules which refract light strongly, and evidently consist of fat. These molecules have been termed the *molecular basis of the C.* When examined after passing through the glands into a special cavity called the *receptaculum chyli*, it is found that the molecular matter is much more scanty, while there are numerous corpuscles present, resembling either the colourless cells of the blood, or biscuit-shaped cells, not unlike the coloured corpuscles. The C. passes from the receptacle just alluded to through the thorax along the thoracic duct, and is poured into the venous system at the root of the neck, at the junction of the left internal jugular vein with the left subclavian vein. C. has been found to contain fibrin, albumin, fat, alkalies, and a small amount of iron. During fasting the C. is poor in solid matters, more especially in fat. A diet containing fat increases the milky appearance of C. owing to the increased amount of fat absorbed. The C. of a cat, according to Nasse, yielded in 1000 parts the following constituents:—Water, 905·7, and solid matter, 94·3. The solid matter was composed of—fibrin, 1·3; fatty matter, 32·7; albumin, 48·9; chloride of sodium, 7·1; other soluble salts and traces of iron, 2·3; and earthy salts, 2·0. See DIGESTION, LACTEALS, VILLUS.

Chyme (Gr. *chymos*, 'a liquid or juice,' from *cheō*, 'to be fluid'), the name given to food after it has been digested in the stomach, and before it has been acted on by the biliary, pancreatic, and intestinal secretions. Some apply the term to food while in the stomach or small intestine. In the latter, part of it becomes absorbed either by the blood-vessels or by the lacteals. See DIGESTION.

Cialdi'ni, Enrico, an Italian general and politician, was born at Lombardinæ, Modéna, August 8, 1811. Exiled for sharing in a rising against the Austrians in 1831, he studied at Paris and fought against Don Carlos in the Spanish war of succession. He played a brilliant part in the Venetian campaign of 1848-49, and served as colonel among the Piedmontese who engaged in the Crimean war. He won distinction in the Italian war of 1859; defeated the Papal troops at Castelfidardo in 1860; was made, after capturing the citadel of Messina, general of the army; and in 1861 succeeded San Martino as lieutenant-general of Naples, where he strove vigorously to suppress brigandage. He was elected senator in 1864. He ably opposed the Austrians in the Venetian campaign of 1866, and was in the same year made commander-in-chief of the troops of Central Italy. His political has been less successful than his military career.

Cibb'er, Coll'y, English dramatist, was the son of Caius Gabriel Cibber or Cibbert, a sculptor from Holstein, and was born in London, 6th November 1671. About 1690 he became an actor, and came before the world as a writer of plays in 1695, when he produced the *Love's Last Shift*, soon followed by *The Woman's Wit*, *Careless Husband*, &c., which were very popular at the time, and brought C. much money. In 1711 he became one of the joint patentees of Drury Lane, and in 1730 was made poet-laureate, an appointment which secured him an unenviable immortality in the *Dunciad*, to the author of which he had given offence. He died 12th December 1757. Some of C.'s pieces are still acted, but the work by which he is best known is his amusing *Apology for his own Life*.

Cibol, or Ciboule, the French form of the Lat. *cæpulla*, a diminutive of *cæpa* (Sc. *sybæ*), an 'onion.' See ONION.

Cibo'lium. See BAROMETZ.

Cibra'rio, Luigi, an Italian jurisconsult and historian, born at Turin, 23d February 1802, where he graduated as doctor of civil and common law in 1824. In 1825 he published his *Notizie sulla Storia dei Principi di Savoia*; in 1826 his *Notizie di Paolo Simone dè Balbi*, and in 1827 his *Delle Storie di Chieri Libri IV*. Nominated a senator in 1848, he was, after the fall of Carlo Alberto and his retirement to Oporto, deputed by his colleagues to visit him in his voluntary exile, and try to induce him to return to his kingdom. The result of this unsuccessful mission he published in 1850 in *Ricordi di una Missione in Portogallo al Re Carlo Alberto*, which threw a vivid light on the Italian Revolution of 1848. Besides these he published several histories, a treatise *Della Economia Politica del Medio Evo* (2 vols. Tur.

1839; 5th ed. 1861), as well as numerous editions of ancient Italian authors, illustrated by valuable notes. Under Vittorio Emanuele he was appointed superintendent-general of customs in 1850, Minister of Public Instruction in 1852, Minister of Foreign Affairs in 1855, and afterwards principal secretary to the King. His *Operette Varie* were published at Turin in 1860. C. died at Salo, in Brescia, 1st October 1870.

Cica'da, a genus of Homopterous insects, included in the section *Trimera* (three-jointed tarsi). These insects belong to the Hemipterous group of the order Homoptera, and possess short broad heads. The eyes are large and prominent, and three ocelli exist, placed in the back of the head. The beak or rostrum is long and three-jointed. The males possess peculiar 'drums' at the base of the abdomen, whereby they produce loud sounds. The females possess ovipositors, saw-like in form. The antennæ are seven-jointed. The sound of the males is very loud, and can be heard at a great distance. The colour of the insect is yellowish. The wings are firm, transparent, and shining, and the nervures are distinct. These insects are mostly tropical in habits, one species (*C. Anglica*) occurring in the S. of England. Several species are eaten like locusts. The ancients knew of these insects, and said that the cicadas should be happy insects, since they had 'voiceless wives.'

Cicatric'ula. See Egg.

Cicc'a, a genus of plants of the natural order *Euphorbiaceæ*, consisting of small trees and shrubs, natives of tropical India, Africa, and America. *C. disticha*, the 'Otaheite gooseberry,' is a native of India, but is cultivated in that and in many other countries for the sake of its fruits, which are used either raw or cooked in various ways. The Europeans pickle or preserve them, or bake them in tarts. In Java they are sold in the market for about threepence per gallon. A decoction of the leaves causes perspiration, and the roots are a violent emetic. The wood of *C.* (*Prosorus*) *Indicus*, of Bombay and Ceylon, is white and tough, and is used for shipbuilding in the latter country. Its light-blue seeds constitute a favourite food of the green pigeon.

Cic'ely (*Myrrhis*), a genus of umbelliferous plants, of which one species (*M. odorata*, the sweet C.) is common in Southern and Central Europe, though in Britain, from being generally found near human habitations, it is looked upon as introduced. It is allied to the *Chevril* (q. v.). and indeed is sometimes so called; in Scotland it is known as *Myrrh*. In Germany the seeds, roots, and young leaves are used for giving an anise-like flavour to soups, &c., and at one time they were used as an aromatic in medicine. In America, *Osmorrhiza* is called *sweet C.*

Cicer. See Chick-Pea.

Cic'ero, Marcus Tullius, the prince of Roman orators, and famous also as statesman and man of letters, was born near the town of Arpinum, under the Volscian Hills, 3d January 106 B.C. His family belonged to the equestrian order, but was not accounted 'noble.' C.'s father—a quiet country gentleman—anxious to give his sons the best education in his power, had them removed to Rome, where the future orator was instructed under Greek teachers in all the branches of a liberal education. At the age of sixteen he entered on his special studies for the bar. In the Marsic War, 89 B.C., he acquired a knowledge of military tactics under Sulla; but after a brief period of service he returned to philosophical studies. He made his first appearance as a pleader at the age of twenty-five, and two years after secured the acquittal of Roscius, who had been charged with parricide by Chrysogonus, one of Sulla's favourites. Briefs now poured in upon him, and after a time of intense exertion, which threatened to impair a constitution never robust, he retired for a while to Athens and Asia Minor, to pursue the congenial studies of elocution and philosophy. Fame and honours awaited him on his return. Elected Quæstor 76 B.C., he earned by his able and just administration of the government of Sicily in the following year the gratitude of the Sicilians, to whom he still further endeared himself by his successful impeachment of their Prætor, Verres, 70 B.C. After passing through the offices of Ædile, 69 B.C., and Prætor, 66 B.C., he was elected Consul in 64 B.C. by acclamation rather than by vote. In the following year, with consummate courage, caution, and decision, he denounced and crushed the famous conspiracy of Catiline (see Catiline), for which he received the thanks of the people, and was hailed 'Father of his country.' Public thanksgivings in his name were voted to the gods, an honour hitherto accorded only to victorious generals. But in putting the imprisoned conspirators to death without trial, C. had been guilty of an act which, though perhaps morally justified by the emergency, was clearly illegal, and he was called to account for it by Metellus Celer. The enthusiasm of the people proved all-sufficient for him at the time, and but for the vehemence with which he attacked Clodius for invading the rites of the Bona Dea, the charge might have been allowed to rest for ever. Clodius, however, bent on revenge, sought, and in time obtained, the tribuneship, revived the charge, and compassed C.'s banishment, April 58 B.C. On 4th August 57 B.C., a bill for his recall was submitted to the Comitia Centuriata and carried; whereon he set out for Rome, which he reached on 4th September, 'borne back,' as he himself says, 'on the shoulders of Italy.' But his spirit had been broken by exile, and he tamely submitted to many degradations, and condescended to acts of servility towards men whom he despised. His time-serving policy with regard to Cæsar and Pompey was fraught with mischief to the state, and marred his reputation as a patriot. On the other hand, the independence evinced by his defence of Milo is a redeeming feature in his character. During the years 57–52 B.C. were composed his *De Oratore*, *De Republica*, and *De Legibus*. In 53 B.C. C. was elected into the College of Augurs, and in the following year appointed to the government of Cilicia, which he managed with great ability and success (51–50 B.C.). He returned to Rome by Ephesus and Athens at the outbreak of the civil war, 49 B.C., and after much vacillation joined the side of Pompey, whose standard he forsook after the battle of Pharsalia, 48 B.C. Having obtained a reconciliation with Cæsar, he retired to the country and wrote many philosophical and theological works, chief of which were *Orator*, *De Finibus*, *Hortensius*, *Tusculanæ Disputationes*, *De Natura Deorum*, *De Senectute*, *De Amicitia*, *De Officiis*. On the murder of Cæsar, 44 B.C., C., who was inclined to throw in his lot with Brutus and Cassius, advised an adjustment of the differences between Antony and the Senate, but to no purpose. Then followed those terrible philippics—of fame how fruitful, to himself how fatal!—in which he denounced Antony with relentless bitterness. The dazzling glory with which he had been for a few brief months encircled now paled; the defection of Octavian, in whom he had placed unlimited confidence, was followed by the second triumvirate, and the name of C. was in the list of the proscribed. Octavian made no effort to save him, and the emissaries of Antony overtook him near Formiæ as he fled in a litter to Cajeta. Deeming resistance vain, with becoming fortitude and resignation he extended his head from the litter, and it was severed from his body by Herennius, 7th December 43 B.C., in the sixty-third year of his age.

Dr Middleton, in his charming but partial biography of the orator, has exhibited him as a pattern of splendid virtue and blameless honour; while Drumann and Mommsen have assailed him with great bitterness and severity. C.'s character was of the Asiatic type. He was ambitious, fond of pomp, greedy of applause, timid, and irresolute. In private life he was kind and amiable. In his literary compositions his fame is of the highest, and his style is a model of purity. His philosophical works breathe the strictest morality, and are especially valuable as reflecting the different views of the Greek schools of philosophy. As a poet he ignominiously failed. As a statesman his abilities were great, but often misdirected; to the active virtues of a patriot he can lay no claim. As an orator he was without a rival.

The *editio princeps* of C.'s collected works was printed at Milan (4 vols. fol. 1498). The best edition is that of Orelli (9 vols. 8vo, 1826–37), and the best English Life of C. is that by Forsyth (2 vols. Lond. 1864).

Cicero'ne (from *Cicero*, the orator), a term given by the Italians to those persons who point out to strangers the curiosities of a place, and now generally applied to any one who acts as a guide. The etymology of the word indicates ironically the noted garrulity of such officials.

Cicisbe'o, an Italian term for a gallant, a dangler after women. In the *Dizionario della Crusca* it is applied to the knot of ribands formerly attached to the hilts of swords or to the handles of fans. So a C. is a man in constant attendance upon a woman, and at hand to receive her commands. The term was applied more particularly to a class of men who attended on married ladies, and is synonymous with *cavaliere*

servente. The custom, formerly prevalent in fashionable Italian society, has now almost disappeared.

Cico'nia. See Stork.

Cicut'a, or **Water Hemlock.** See Hemlock.

Cid, The, Don Rodrigo Diaz de Bivar ('he of the perfect beard'), was born at Burgos in the year 1025, in the reign of Sancho III. of Navarre, and of a family from whom had been chosen the 'judges of Castille.' C. is derived from the Arabic *Said*, or master: his other title, *El Campeador* (corrupted by the Arabs into *Cambitûr*), means either national champion or umpire. Soon after his birth, the dynasty of Ommeyad Califs at Cordova was broken up, and Fernando I. of Castille united the petty Christian states of N.W. Spain. The story of *The C.*, told by Corneille and Voltaire in their dramas so named, of his love for Ximena, the daughter of Count Lozano of Gormaz, whom he had slain to avenge an insult offered to his father, of his conquest of five Moorish chieftains who had invaded Castille, of his horse Babieca (or Booby), on which he drove the Moors from Estremadura (on E. bank of Douro) and captured Coimbra, how he resisted the imperial pretensions of Henry III., and assisted Sancho II. of Castille to annex his brother's inheritances of Leon and Galicia, of his banishment by King Alfonso, and his great deeds at Barcelona, Zaragoza, Valencia, Alicante, and other places on the E. coast, how he defended Valencia against the Moors, how the cause of the C. and the Counts of Canion was tried before the Cortes at Toledo: all this is told in the prose *Chronicles of the C.*, belonging to the end of the 13th c. (one of which has been translated and edited by Southey), and in the *Ballads of the C.*, collected by Juan de Escobar in 1615, which have been translated into German by Herder, and partly into English by Frere, Lockhart, and Dennis. These ballads are among the finest and earliest of the Spanish *redondilhas* sung by the *Juglares*, the form of which has been connected with Arabian poetry, and also with the songs of the Roman soldiery. They are written in *coplas* of four lines, each line with seven or eight syllables, or three and a half feet, generally trochaic; the chief feature being the assonant rhyme, according to which the *last vowel*, when the line ends with a single syllable (a half foot), or the *last two vowels* when it ends in a trochee, should correspond in every alternate line, be the consonants what they may. The *Poem of the C.* is in Alexandrines. See Southey's *Chronicle of the C.* (Lond. 1808); Huber's *Geschichte des C.* (Brem. 1829); and Dozy's *Rècherches sur l'Histoire Politique et Litteraire de l'Espagne pendant le Moyen Age* (1849).

Cid'aris, a genus of *Echinoidea* or Sea-urchins, included in the family *Cidaridæ*, and distinguished by having the mouth central in position, and the anus opposite the mouth, surrounded by genital plates. The ambulacra, or perforated areas of the shell, are prolonged on the buccal membrane, or that surrounding the mouth, and no buccal branchiæ, or gill-like processes surrounding the mouth, are developed. *C. papillata* is a familiar species of these forms.

Ci'der, or **Apple-Wine**, a fermented drink prepared from the juice of apples, for which particular varieties of apples are cultivated in Herefordshire and Devonshire, Normandy and Holland, the most famous C.-producing districts. The apples, when thoroughly ripened and matured, are reduced to a pulp in a grinding mill under edge rollers, with a small quantity of water added, and after being left in a tub for twenty-four hours, the juice is pressed out by the application of strong pressure. The expressed juice, after being put into barrels, soon begins to ferment violently, and when the fermentation has sufficiently advanced, which happens in from two to ten days, according to the strength of the must, and the amount of alcohol desired, the C. is racked off into stone barrels. C. contains generally malic acid, alcohol, and sugar, besides water, &c., its alcoholic strength varying from 5 to 10 per cent.

Cie'za, a town in the province of Murcia, Spain, 25 miles N. W. of Murcia, near the river Segura, has manufactures of linens, silk, and hemp, and a trade in oil and wine. Pop. 9500.

Cigar' (Span. *cigarro*), a loosely wound spindle-like roll of tobacco-leaf for smoking, supposed to be of Spanish origin. A *cheroot* is a variety of C. in the form of a slightly conoidal cylinder, with the tips cut straight. A *cigarette* (Span. *cigarrito*) is a smaller roll of finely-cut tobacco, or of triturated leaf (as in Spain), wrapped in a binder of unsized paper or the leafy covering of Indian-corn. Cigars are manufactured in enormous quantities wherever the tobacco plant is cultivated. Those made from Havannah tobacco are unsurpassed for fine flavour, aroma of smoke, and firmness and whiteness of ash, and next in order of excellence stand the Manilla cigars and cheroots. The value of a C. does not increase in direct ratio with its size, for the difficulty of obtaining wrappers of proper length, colour, and fineness for the larger sizes, immensely augments the expense of manufacture. A duty of 5s. per lb. is levied upon cigars imported into Great Britain, and in 1873 this source of revenue yielded £283,492. Simple and well-contrived machines for making cigars and cigarettes are in extensive use.

Cig'oli, Ludovico Cardi da, an Italian painter, was born at Cigoli in Tuscany in 1559, studied Correggio assiduously, and was among the first of the Florentine school to successfully oppose the anatomical style of the imitators of Michael Angelo and the other mannerists of his day. His design is correct, his colour is remarkable for force, warmth, and harmony, and his handling exhibits much vigour and *abandon*. His 'Apostle healing the Lame' in St Peter's was declared by Andrea Sacchi to be surpassed by only two pictures in Rome—the 'Transfiguration' of Raphael, and the 'Communion of St Jerome' by Domenichino. Tuscany is particularly rich in specimens of his work. The 'Martyrdom of St Stephen,' in the palace of the Uffizi, Florence, is reckoned one of his finest efforts. C. died at Rome in 1613.

Cil'ia. These are small hair-like bodies, having a power of motion, attached to a variety of epithelial cells. A layer of cells of this variety is called a layer of *ciliated epithelium*. Such cells are of a columnar shape, bearing the C. on one extremity, while the other lies on, or is attached to, subjacent tissue. The cells are usually arranged in three or four layers deep, but the external layer is the only one fully developed, the deeper layers being destitute of C. Ciliated epithelial cells vary in size. In the human trachea or windpipe, they are about $\frac{1}{3000}$th to $\frac{1}{2500}$th of an inch in length, but in many of the invertebrata they are much larger. They are found in the following situations in the human body:—(1) On the mucous membrane of the respiratory tract, from the base of the epiglottis to the smallest bronchial tubes in the lung. The vocal cords and the air-cells of the lung are not covered by C. (2) On the mucous membrane of the nose, with the exception of the area in the upper chambers devoted to the sense of smell. (3) On the mucous membrane of the female generative organs from the middle of the neck of the uterus to the free edge of the fibriated extremity of the Fallopian tube. (4) On a portion of the tubular structure of the testicle. (5) On the lining membrane of the cavities of the brain and spinal cord in the new born child. In adult life, however, they are limited to the central canal of the cord, the posterior end of the fourth ventricle of the brain, the aqueduct of Sylvius, and the lateral ventricles. (6) In the Eustachian tube and in the middle ear or tympanum.

Form of Cilia.—They are slender, conical, or sabre-shaped filaments, narrow at the free extremity, and broad at the base. Under the highest powers, they show no indication of definite internal structure.

Motion of Cilia.—This may be best studied by examination of a portion of the gills of the common mussel. It is seen to be a sort of lashing movement, and when many act together on the same bar or surface, the motion gives rise to the optical effect of a series of waves passing along the free border of the ciliated surface, like the waves caused by wind passing over a field of corn. Occasionally the movement is so rapid that the C. are not seen, but their presence is indicated by the movements of particles of matter in their vicinity. Adopting the classification of Valentin and Purkinje, the movements of C. may be divided into (1) the *hook-like*, in which the movements are like those of a finger alternately flexed and extended; (2) the *funnel-shaped*, in which there is a kind of twisting action of the cilium by which its apex describes a circle or ellipse, and the whole cilium a cone having the base uppermost; (3) the *oscillating*, in which it swings like a pendulum; and (4) the *undulating*, or flail-like, in which it acts like the lash of a whip. Few objects are more beautiful than a mass of C. in vigorous action. In cold-blooded animals the motion of the C. may continue for hours, or even days after the death of the animal, but in warm-blooded animals they rarely act for more than two hours.

Effects of physical and chemical applications on Cilia.—(1) *Temperature.*—A rise of temperature increases the activity of the movement, but it ceases at 57° or 60° F. Cold does not retard the action even when reduced to freezing-point. (2) *Water.*—Fresh water retards or destroys the action of C. of sea-animals, while salt water has a similar effect on those which frequent fresh water. (3) Bile, alkalies, acids, and alcohols arrest the motion. (4) Vapour of chloroform arrests the motion for a time, if not applied for too long a period. (5) Oxygen is required for the activity of C.; deprivation of it, or an atmosphere of hydrogen, arrests the movement. (6) A stream of carbonic acid retards the action. (7) Continuous or Faradic currents of electricity, or a discharge from a Leyden jar, have no effect unless extremely powerful, when they cause either electrolysis or sudden stoppage.

C. are endowed with the vital property of contractility, and it is in virtue of this they move. Their actions are not dependent directly on the integrity of the nervous or circulatory systems, as they work vigorously for some time after the death of the animal. See CONTRACTILITY.

Cili'cia, anciently a province of Asia Minor, coinciding partly with the modern vilayet of Adana, bounded on the N. by Taurus, on the S. by the Levant, on the W. by Pamphylia, and on the E. by the range of Amanus. Its physical characteristics divided it into two parts, the Western or Rough C., and the Eastern or Plain C., the former clothed with forests, and the latter producing corn and wine. C. was governed by native kings, even after it became a Persian satrapy. After the victory at Issos (333 B.C.) it became a Macedonian province, and on the death of Alexander it became part of the kingdom of the Seleucidæ, till Pompey made it a Roman province, B C. 63.

Cimabu'e, Giovanni Gualtieri, an early Italian painter, was born at Florence in 1240. Being sent while a youth for purposes of education to the convent of Santa Maria Novella, he there learnt his art from certain Grecian painters, who were engaged in decorating the church of the convent, and soon acquired so much celebrity that in 1263 he was commissioned to adorn with frescoes the Church of St Francis at Assisi. Among his subjects were the 'Life of Christ,' 'Life of St Francis,' 'Life of the Virgin,' 'Four Evangelists,' &c., portions of which still remain. Returning to his native city, C. painted his famous 'Madonna' (still preserved), which was regarded as a marvel of art, and excited such enthusiasm that the people bore it in procession from his studio to the Church of Santa Maria. He died at Florence, probably in 1302. His chief distinction is, that he materially helped to emancipate Italian art from Byzantine traditions. He ceased to be a copyist, turned his attention towards nature, and diversified the mechanical *pose* of Greek figures by study from living models. In this restoration of art, however, C. cannot be regarded as having done more than prepare the way for Giotto (q. v.), who was his pupil and protege.

Cimaro'sa, Domenico, an Italian musician, was born at Naples in 1754, and studied under Sacchini at Loretto. He very early attained celebrity as a composer of operas, of which one—*Il Matrimonio Segreto*—is still well known. C. undertook musical engagements at St Petersburg, Vienna, and other European courts, but eventually returned to Italy, and died at Venice, 11th January 1801.

Cim'balo, an old keyed instrument, one of the precursors of the harpsichord.

Cim'bri, or **Kim'bri**, a people who, in conjunction with the Teutones, invaded Southern Europe towards the close of the 2d c. B.C., and defeated several Roman armies in succession, till they themselves were conquered by C. Marius, B.C. 101, in the Campi Raudii, near Vercelli, with a loss estimated at from 100,000 to 140,000 men. Who these C. were has given rise to much discussion. Tacitus, Pliny, and Strabo agree in making their original country the Chersonesus Cimbrica, now the peninsula of Jutland. The preponderance of ancient testimony is in favour of their Celtic origin, and H. Müller, in his *Die Marken des Vaterlandes*, holds to this opinion, and contends that the name is identical with *Kymri*, the designation of the modern Celts of Wales. Modern opinion, however, favours their Germanic origin; and the definite facts that support this hypothesis are stated by Mommsen, *History of Rome*, vol. iii. pp. 178, 179, (Dickson's translation). The name C., or *Chempho*, is certainly Teutonic (comp. Old Eng. *Kempa*, and Ger. *Kämpfer*), and means the 'champions,' which their enemies translated the 'robbers.' Mommsen suggests that 'round a nucleus of Germanic emigrants from the Baltic' had gathered in the course of their wanderings 'an immense multitude of various origin.' This would satisfactorily account for many Celtic traits which the motley host exhibited.

Cim'ex and **Cimic'idæ**. See BUG.

Cimicifu'ga, or **Bugbane**, a genus of plants belonging to the order *Ranunculaceæ*, natives of Eastern Europe, Siberia, and N. America. The European *C. fœtida* is extremely fetid, and is used to drive away bugs and other vermin—hence the specific name ('bug-fleer').

Cimme'rians, or **Cimme'rii**, a people of whom Homer may be said to give a dim, fabulous tradition, and Herodotus a definite and partially historical account. In the Odyssey they are represented as dwelling in darkness beyond the ocean-stream. In Herodotus they occupy the territory between the Borysthenes (Dnieper) and the Tanais (Don), and are represented as having invaded Asia after they were expelled from their own country by the Scythians. They seem to have occupied the Tauric Chersonesus (Crimea), and from them the Cimmerian Bosporus (Strait of Yenikale) takes its name. They were a nomadic race.

Cim'olite. See FULLER'S EARTH.

Ci'mon, a famous Athenian general, son of the Miltiades who conquered at Marathon, was born 510 B.C. His life was mainly devoted to the overthrow and humiliation of his country's great enemy, Persia. In 477 he shared with Aristides the command of the Athenian contingent of the Greek armament under Pausanias, reduced Eion on the Strymon, and in 476 subdued and colonised the island of Scyros. In 466 he completely defeated a great Persian fleet at the river Eurymedon, and subsequently expelled the Persians from the Chersonese. C. regarded Sparta as the 'yoke-fellow' of Athens, and on the revolt of the Helots headed two expeditions to aid the Spartans. Having been, however, on the second occasion, insultingly dismissed by them, C. lost his popularity at Athens, failed in the struggle against Ephialtes and Pericles, and was eventually ostracised. He was recalled five years later, and under his influence the Athenians made peace with Sparta, and renewed the war with Persia. In 449 he sailed with 200 ships to Cyprus, where he died at the siege of Citium.

Cincho'na, an important genus of evergreen shrubs or trees, natives of the valleys of the Andes, and which give the name to the order to which they belong (*Cinchonaceæ*). They are found from about lat. 19° S. to Caracas, in about 10° N. lat., and at heights from 4000 to nearly 12,000 feet above the sea-level. There are many species, but all do not yield the medicinal bark known in medicine and commerce as C. or Peruvian bark. The different species have been the subject of elaborate investigation, by Weddell, Howard, Markham, Spruce, and others, and the general result of their investigations is, that the Calisaya or yellow bark is the produce of *C. Calisaya*, the grey or Huanco bark of *C. micrantha* and *C. nitida*, Loxa or crown bark of *C. Condaminea* (*officinalis*), while the red bark is furnished by *C. succirubra*. The value of C. bark as a tonic and remedy for fever is owing to the presence of the alkaloids *quinia*, *quinidia*, *cinchonia*, and *cinchonidinia*—some of the barks, however, containing more than others. For instance, *quinia*, the most useful of all of them, is found in greatest quantity in Calisaya bark, *cinchonia* in grey and red bark, while *quinidia* exists in largest amount in Loxa bark. All of these alkaloids, though varying in degree of strength, have similar properties. The C.-trees grow in the forests of Bolivia, Peru, and neighbouring countries in small groups. The *cascarilleros* or bark-gatherers are native Indians or half-castes, whose occupation is one attended with great labour. After a tree is cut down, the bark is stripped off, and the larger pieces stacked to dry, while the thinner bark from the twigs and branches rolls up in 'quills' like that of the cinnamon-tree. The bark nearest the root is most esteemed, on account of the quantity of alkaloids contained in it. After being dried, it is conveyed to the coast on the backs of the *cascarilleros*, or in any other way that the circuitous paths through the mountainous forest will admit of. The object of the *cascarilleros* being to collect the greatest quantity of bark in

the shortest possible space of time, they indulge in the most wasteful destruction of the C. forests, young trees and old being indiscriminately cut down without any attempt to replace them by planting others. In course of time the effects of this suicidal policy began to be apparent. The supplies of bark became more and more difficult to obtain, and it was evident that in time the tree yielding this drug, so all-important in tropical countries, would soon become practically extinct. Accordingly the Indian Government took measures to naturalise it in the cooler hill-regions of India. This task was committed to Messrs C. R. Markham, R. Spruce, M'Ivor, and others, and was performed with such success, that extensive forests are now growing in various parts of India, and promise to yield, in course of time, a supply of C. much greater than ever was obtained by the precarious labours of the S. American *cascarilleros*. Owing also to the scientific skill with which the trees are cultivated, it is found that the Indian-grown bark yields a greater supply of the alkaloids than the wild trees. It is also now naturalised in Jamaica and Java. C. bark was first employed in Europe about the middle of the 17th c., though its valuable properties as a febrifuge were long known to the natives of Peru. It was first brought from that country to Europe in 1639 by the Countess del Chinchon, wife of the then Viceroy of Peru, and from whom the genus is now named, though—notwithstanding the appeal of Mr Markham for the correct spelling of the word, C*h*inchona—long usage has now established the genus without the *h*. From the fact of the Jesuits using it as a remedy in intermittent fever, the C. bark was at one time generally known as, and is still sometimes yet called, 'Jesuit's bark.' It is also called China bark, Quinia, Quinquina, &c. It is now generally administered in the form of its alkaloid quinine, or in the sulphate or disulphate of quinine, in doses of from 1 to 20 grains. In addition to its anti-periodic febrifugal and tonic properties, the bark is somewhat astringent, and has been occasionally found serviceable as a topical astringent and antiseptic. See Pareira's *Materia Medica*; Moquin-Tandon's *Botanique Médicale*, and the various works and reports of Markham, Weddell, Howard, Spruce, and others on the subject.

Cinchona'ceæ, a natural order of Dicotyledonous plants, of which the genus *Cinchona* (q. v.) is the type. By some botanists it is considered only a division of *Rubiaceæ* (q. v.). There are about 2600 species, distributed over 300 known genera, consisting of trees, shrubs, and herbs, all natives of tropical and warm regions. It is very important as furnishing many plants useful in medicine, the arts, and domestic economy. Some possess tonic, febrifugal, emetic, astringent, or purgative properties; others yield dye and tanning agents; while a third group possess edible fruits and seeds. A few are reputed to be intoxicating and even poisonous, and several are cultivated for the sake of their beauty and the fragrance of their flowers. In addition to Cinchona, Coffee, (q. v.), Ipecacuanha (q. v.), *Morinda citrifolia*, the root of which yields Soorangie dye, *Uncaria Gambir*, which yields white Gambir, a variety of catechu, *Gardenia*, and other plants yielding pleasant fruits, Chayroot (q. v.), &c., may be mentioned as some of the more important economic plants of this order.

Cin'chonine and **Cinchon'idine** are isomeric alkaloids (q. v.), contained, along with the quinine alkaloids, in the bark of the different varieties of Cinchona. Pale Peruvian bark is richest in C. and its isomer; yellow Peruvian bark in quinine. Another alkaloid called *Cinchonicine*, isomeric with C. and C., is obtained under certain conditions by heating the latter substance. The composition of these bodies is represented by the formula $C_{20}H_{24}N_2O$; that of quinine and its isomers by the formula $C_{20}H_{24}N_2O_2$. Sulphate of C. is used in medicine, and is similar in its physiological action to sulphate of quinine. See QUININE.

Cincinde'la, a genus of *Coleoptera* or Beetles, forming the type of the family *Cincindelidæ*, and popularly known as 'Tiger-beetles' or 'Sparklers,' from their carnivorous habits, and from the brilliant hues and lustres of their bodies. The tiger-beetle (*C. campestris*) is a familiar British species, and is noted for its voracious habits, feeding on other insects, and being able to pursue its prey into the air. It exudes a powerful odour or scent, like that of a crushed verbena leaf. The Indian tiger-beetle (*C.* [illegible]) is another well-known species. These insects have five-jointed tarsi; the head is wider than the chest, and the mandibles are large, sharp, and toothed.

Cincinna'ti, the 'Queen City of the West,' is the chief town in Ohio, and is situated on the N. bank of the Ohio river. It is built on two terraces, the one 50, the other 100 feet above the river. The streets and the environs of the city are alike beautiful. C. has many fine buildings, as the C. College, the custom-house, the post-office, and Burnet House. There are two Roman Catholic colleges, and one Methodist; a Presbyterian theological seminary, a law school, several medical and ladies' institutions, besides many free schools, and about a hundred churches. C. is connected with Covington, on the Kentucky side of the Ohio, by a magnificent suspension-bridge, 100 feet above low-water. The city is supplied with water from the Ohio by a reservoir which cost $796,000. C. is the greatest pork-market in America, the killing and packing being an immense industry. Wine, from the native Catawba (q. v.) grape, is also an extensive article of trade, and there are large manufactories for iron, steam-engines, lard, flour, soap, and candles. The Ohio is the great outlet for traffic, the river being navigable to its junction with the Mississippi, 500 miles below, and to Pittsburg, 460 miles above the city. In 1864 the exports were $239,079,825, and the imports $389,790,537. C. was founded in 1788, and had only 500 inhabitants in 1800; in 1830 it had 24,830; in 1870, 216,289.

Cincinnati (Order), a society in the United States, which was formed in 1783 by the officers of the revolutionary army, to perpetuate their friendship, and to provide for the widows and orphans of those who had fallen in the war. The badge of the society is a bald eagle of gold, with the motto *Omnia reliquit servare rempublicam*. It is suspended by a deep-blue ribbon edged with white. The order was to be hereditary; hence it met with much opposition. It still, however, exists in some of the States, and meets on the 4th of July.

Cincinna'tus, Lucius Quinctius, a Roman statesman and soldier, famous in the national legend preserved by Livy for the simplicity of his life and manners. He was born sometime before the expulsion of the Tarquins. In 460 he was illegally appointed *consul suffectus*; and two years afterwards, being made dictator, he extricated the Roman consul and army from imminent destruction at the hands of the Æqui. Livy's narrative of the manner in which he effected this is rejected by Niebuhr as transparently mythical. In B.C. 439, at the age of eighty, he was a second time appointed dictator, to suppress a plebeian discontent fostered by Spurius Mælius, after which he disappears from history. In the Roman legend, C. stands forth as a type of simple antique virtue; but modern criticism, when it allows his existence, is somewhat hard upon his patrician narrowness.

Cin'erary Urns (Lat. *cinis*, 'ashes') were the vessels in which the ashes of the dead were placed amongst those nations who were accustomed to burn their dead. When the funeral pyre was burned down, the embers were extinguished with wine, and the bones and ashes of the dead collected by the nearest relatives, who sprinkled them with perfumes and placed them in an urn, which was then deposited in a niche of the *sepulcrum*, or family tomb. The urns were mostly made of baked clay, but also of stone and metal, and even, though rarely, of gold and silver. They were of various shapes, but commonly square or round.

Cinn'a, Lucius Cornelius, the leader of the Marian party during the absence of Sulla in the East. Though elected consul (B.C. 87) with the sanction of Sulla, his first act was to impeach him, and to take measures for bringing back the banished Marians to power. Defeated in the senate, he fled from the city, on which, however, he soon marched with an armed force, and invested it by land, while Marius, who had returned from his African exile, blockaded it by sea. They captured the city, massacred the friends of Sulla, and declared themselves consuls (B.C. 86). Marius died soon after. In his fourth consulate, Cn. Carbo being his colleague, C. collected an army at Brundisium to meet Sulla, who had returned to Italy to take vengeance on his foes, but he was slain while attempting to quell a mutiny that had broken out among his troops.

Cinn'abar, native mercuric sulphide, HgS, the most abundant ore, and chief source of the quicksilver or mercury of commerce. It occurs fibrous and amorphous, also crystallised in

hexahedral prisms. In the mass it is dull-red coloured, opaque or translucent, with adamantine lustre. The most important mines are those of Idria in Carniola, Austria, of Almaden in Spain, and of New Almaden, New Idria, and Redington, in California. C., artificially prepared, constitutes the well-known colour Vermilion (q. v.).

Cinnam'ic Acid and the **Cinnamyl Group.** C. A. is a white crystalline substance, resembling benzoic acid in appearance, and is contained in Storax (q. v.), Tolu, and Peru balsams, in old oil of cinnamon, and in gum benzoin. C. A. is best obtained by boiling storax with a dilute solution of caustic soda, when soluble cinnamate of soda is formed. The aqueous solution of this salt is filtered from the undissolved portions of the storax, and mixed with excess of hydrochloric acid, when the C. A. is precipitated, and may be purified by recrystallisation from boiling water.

C. A. crystallises in rhombic prisms: it fuses at 133° C., and boils at 290° C., with partial decomposition. It rises in vapour at temperatures below its boiling-point, and may therefore be purified by sublimation. It is sparingly soluble in cold water, more readily in boiling water, but its best solvent is alcohol. C. A. is a monobasic acid, and has the composition represented by the formula $C_9H_7O(OH)$, or $C_8H_7(COOH)$. It forms crystalline salts with metals, and several interesting derivatives, the following being among the most important:—

Cinnamic Aldehyde, $C_8H_7(COH)$.—This is an oily liquid, which forms the chief constituent of the essential oils of cinnamon and cassia, and gives to them their characteristic odour. It may be prepared artificially by distilling a mixture of formiate and cinnamate of calcium. See ALDEHYDES.

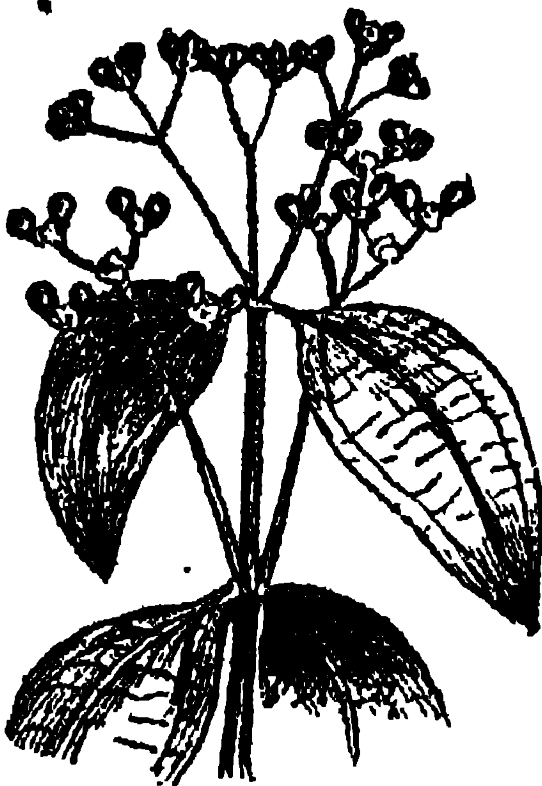
Cinnamate of Cinnyl or Styracine, $C_8H_7(COOC_9H_9)$, is a crystalline substance contained, along with C. A., in storax, and may be obtained from the latter after the C. A. has been extracted by squeezing the remaining resin, when the styracine is forced out in oily drops, which crystallise on standing.

On distilling styracine with caustic potash, it is resolved into *Cinnamic Alcohol*, $C_8H_7(CH_2OH)$, and cinnamate of potassium. The cinnamic alcohol passes over as an oily liquid, which soon crystallises. It has a pleasant odour of hyacinths.

Styrol, C_8H_8, is another substance contained in storax. If the latter be distilled with water, styrol is carried over with the steam, and condenses in oily drops, which are readily separated from the water by decantation. It is a liquid body, which, when heated to 200° C., is converted into a solid crystalline substance called *meta-styrol*.

Cinnamoden'dron, a genus of plants allied to *Canella* (q. v.), natural order *Canellaceæ*. The bark of *C. axillare*, a Brazilian tree, is aromatic, tonic, and anti-scorbutic.

Cinn'amon, a bark much employed as a condiment, and in medicine as a stimulant, tonic, astringent, carminative, antispasmodic, &c., chiefly derived from the inner bark of *Cinnamomum Zeylanicum*, a tree belonging to the natural order *Lauraceæ* (q. v.). The best comes from Ceylon, but it is now naturalised in various tropical countries. The tree grows to the height of from 20 to 30 feet, and sometimes attains the thickness of 1½ foot. Its properties are owing to a volatile oil, the *oil of C.* It contains in addition a concrete fatty substance, obtained from the ripe fruits, and known in Ceylon as *C.-suet;* this is believed to be the *Comacum* of Theophrastes. From the leaves a volatile oil, having the odour and taste of oil of cloves, is also distilled. The tree itself has been long known: in the Bible, for example, it is frequently referred to under the name *kinnemon* or *kinman*. There are various other species in addition to the one mentioned. *C. Cassia* (*C. aromaticum*) yields *cassia-lignea*, or the Cassia Bark of commerce (q. v.), and C. buds—also, however, obtained from *C. dulce*, *C. Loureiri*, and *C. iners*. This tree is the *kiddah* or *cassia* of the Bible. C. bark is frequently used to adulterate C. Indian Clove Bark (q. v.) is obtained from *C. Culilwan*, Sintoc bark from *C. sintoc*, while *C. nitidum* (*eucalyptoides*) and *C. Tamala* were the sources of the *folia Palabathri*, in such repute among the old pharmacologists as stomachics and sudorifics. The 'Nepal sassafras' is the root of *C. parthenoxylon* and *C. glanduliferu* (Bentley).


Cinnamon.

C. is obtained by stripping the bark off the branches, when it rolls up into 'quills.' The smaller of these are introduced within the larger, and then dried in the sun, and the whole tied up in bundles, each of about 88 lbs. weight. The thinner bark is accounted the finest flavoured. About 500,000 lbs. are annually imported into London.

Medicinally C. is valued as a stomachic and carminative in nausea and vomiting, in cases of flatulence, and spasmodic conditions of the stomach and alimentary canal. It is also reputed to possess the property of restraining uterine hæmorrhage. Its uses by cooks and confectioners are too well known to require description. Bastard C. is *C. Cassia;* black C., *Pimenta acris;* Isle of France C., *Oreodaphne cupularis;* Santa Fé C., *Nectandra cinnamomoides;* wild C., *Canella alba* and *Myrcia acris*.

Cinn'yris. See SUN-BIRD.

Cin'qué Cento (Ital. 'five hundred'), an art term for the 'fifteen hundred period,' *i.e.*, the 16th c., especially the early part—the second period of the revival of the arts in Italy—and for the style of art then prevalent.

Cinque'foil (in botany). See POTENTILLA and COMARUM.

Cinquefoil, or **Quintfoil**, in heraldry, a flower of five foils or leaves, which are usually depicted as issuing from a ball as a centre point. In architecture, the name is applied to an ornamental foliation in five compartments—often represented in a circular form—five points or cusps marking off spaces between each pair, which are called the leaves. The C. is to be observed in the tracery of windows and panellings.

Cinque Ports are Dover, Sandwich, Romney, Winchelsea, and Rye, to which are now added Hythe and Hastings. They are under the government of a Lord Warden, whose office was formerly an adjunct of the premiership. The C. P. have various privileges as to pilotage, issuing of writs, and other judicial matters. They are supposed to have been incorporated previous to the Conquest, by Edward the Confessor. Their ancient organisation has, however, been broken up by the Municipal Reform Act, and assimilated to that of English municipalities in general. The jurisdiction of the Lord Warden has been curtailed by Acts of the present reign.

Cin'tra, an old town in the province of Estremadura, Portugal, near the base of Sierra de C., 15 miles W.N.W. of Lisbon. It has two royal residences, one originally a Moorish palace, the other formerly the convent of La Penna. There is also a ruined castle, and many handsome private buildings. Pop. 4300. The well-known *Convention of C.*, concluded between Sir Hew Dalrymple and Marshal Junot, was signed here August 22, 1808. By this treaty the French, who had retreated upon Lisbon after the defeat at Vimieira, were allowed to return to France with all the honours of war. A storm of indignation was roused in England by this event, and the generals concerned were subsequently tried by court-martial, but acquitted of blame. Wellington sided in opinion with the generals. A severe comment is made by Byron on 'that martial synod' in the first canto of his *Childe Harold*.

Ci'otat, La, a town in the department of Bouches-du-Rhône, France, on the Gulf of Lèques, 15 miles S.E. of Marseille. It has a good harbour, has Government shipbuilding yards and valuable fisheries, and is surrounded by plantations of the olive, orange, and pomegranate. Pop. (1872) 8232. C., the ancient *Citharista*, a Massilian colony, was destroyed by the Teutonic invaders of Gaul, but rose to importance through the Levant trade in the 16th c. It was ruined a second time by the revocation of the Edict of Nantes, and has only begun to recover its prosperity in the present century.

Ci'pher (Fr. *chiffre*, Low Lat. *cifra*, from Arab. *cifr*, 'empty'), in arithmetic, properly denotes the character o, used to fill an empty space, but is now loosely applied to any of the nine figures. In metaphorical language, however, it retains its primary sense—*e.g.*, 'he is a mere C.,' *i.e.*, a nonentity, a person who counts for nothing. Another use of the word is to desig-

nate the interweaving of the initials of a name, an arrangement which renders them a private mark. This usage has long been especially affected. The C. of Tenniel's name is familiar to all who look at the cartoons of *Punch*. Lastly, and perhaps from the preceding practice, the word has also come to be a name for secret writing—*e.g.*, 'the despatch was in C.,' *i.e.*, in an arrangement of letters or marks the meaning of which was only known to the initiated. See CRYPTOGRAPHY.

Cipria'ni, Giovanni Battista, painter and engraver, born at Florence in 1732, travelled to Rome when nineteen years of age, and devoted himself to the study of Correggio. He removed to England in 1754, and settled in London, where he died in 1785. His drawing is correct, and his painting is marked by harmony of colour and sweetness of style. His best plates are his composition named the 'Mother and Daughter,' the 'Death of Cleopatra,' after Benvenuto Cellini, and his 'Descent of the Holy Spirit,' after Domenico Gabbiani. C. furnished the design for the diploma of the Royal Academy, of which he was one of the original members.

Circæ'a, a genus of Herbaceous plants of the natural order *Onograceæ*, of which there are various species in the Himalayas, Europe, &c. *C. Lutetiana*, the 'enchanter's nightshade,' is a native of Britain. It has no relation to the nightshades, and probably the name has, through some mistake, been transferred from the Mandrake (q. v.) to this plant (*Prior*); while the term 'enchanter' has been given it from the sorceress-goddess Circe (q. v.), after whom the genus was named. *C. alpina* is not unfrequent in Scotland and the N. of England. Beyond a little astringency, the plants possess no notable properties.

Cir'cars. See NORTHERN CIRCARS.

Circass'ia, formerly an independent country, now a district in the W. Caucasus, Russia, occupies the N. and part of the S. declivity of the Caucasus (q. v.).

Circass'ians. Under this name may be included all the tribes of the Caucasus, but the C. proper hold only the north-western slope of that range, excepting the country of the Abasians, between the lower Kuban and the Black Sea. The C. are called by the Turks *Tcherkas* (*i.e.*, robbers), but call themselves Adighé. They number about 300,000, and comprise fifteen tribes. They do not belong to the Aryan race—of which, from their fine physique, they were once regarded as a high type—but to the Semitic or Turanian variety. Their peculiar language seems akin to the Turanian tongues. They are brave, strong, and handsome, and the beauty of the Circassian women, who are the favourite ornament of the Turkish harems, is famous throughout the East. Their social state is rude and unprogressive. They are predatory and warlike; and their most stringent customs are to respect age, to revenge a kinsman's death, and to observe a law of hospitality called *kunadi*. Almost none of them except their bards, who are much respected, can write. They are governed by a kind of feudal oligarchy, and are divided into five castes—the chiefs, the nobles, the ordinary freemen, who form the mass of the people, the vassals, who till the soil and follow the nobles to war, and the slaves, either prisoners of war or descendants of such prisoners. Their religion is a mixture of Christianity, Mohammedanism, and Paganism. Christianity was introduced among them in the 11th and 12th centuries, but lately Mohammedanism, which is the creed of the chiefs and nobles, has prevailed. During the middle ages they were subject to the Arabs and Georgians. After throwing off the Georgian yoke in 1425 they fell under the power of the Khans of the Crimea, but during the 18th c. they became free from Tartar influence. The Russians, after annexing Anapa on the Black Sea in 1807, made repeated efforts to subdue the C., who, by the treaty of Adrianople in 1830, were ceded to Russia by Turkey, but, under Schamyl, resisted Russia until Prince Orbeliani defeated them in 1857, and captured Schamyl in 1859. A large number of the C. then sought refuge in Turkish territory, many of whom perished by starvation. Their country may now be considered thoroughly conquered, and the bold spirit of the mountaineers finally quelled. See Spencer's *Travels in Circassia* (8vo, Lond. 1839), and Haxthausen's *Tribes of Caucasus* (8vo, Lond. 1855).

Cir'ce (lit. 'the she-hawk'), a mythic sorceress, 'the daughter of the sun,' who dwelt in the island of Æsea, on the W. coast of Africa. Her 'charmed cup' had the power of changing those that tasted it into swine. When Ulysses, in the course of his wanderings, came to her isle, this fate befell twenty-two of his companions, but the hero himself escaped it by the aid of Hermes, and remained in safety with the enamoured witch for a whole year. The story is told in the 10th and 12th books of the Odyssey. The Latin poets make great use of the story of C., particularly Ovid in the 14th Book of the Metamorphoses.

Cir'cle, according to Euclid, is a plain figure contained by one line, called the *circumference*, and is such that all straight lines drawn from a certain point within the figure to the circumference are equal to one another; this point is the *centre*. It is perhaps easiest conceived of as the path described by either extremity of a rod which rotates in a given plane round a given *fixed* point in the rod. This definition suggests at once a practical method for its description. For the fundamental properties of the C. see Euclid's *Elements*, Book III. The great problem among the ancient geometers with regard to the C. was its *quadrature*—*i.e.*, the construction by rigid mathematical methods of a square equal in area to the C. This area was soon shown to be equal to the product of the radius and the semi-circumference; and accordingly the problem was reduced to that of rectifying the curve and of finding the ratio of the circumference to the diameter. This ratio is the same for all circles; but it is undiscoverable by the geometry of C. and straight line, the constituents being incommensurable. The incommensurability seems to have been suspected by Euclid, whose most wonderful and complete book is perhaps his 10th, dealing with the investigation and classification of incommensurable quantities. The ratio, then, of the circumference to the diameter, invariably represented in mathematics by the Greek letter π, can only be approximately expressed as a number. The first approximation (22 : 7) was given by Archimedes. Another, and nearer, and very convenient value, is 355 : 113. Vieta calculated it to the 10th decimal place, Van Ceulen to the 36th, Sharp to the 72d, De Lagny to the 128th, and Clausen to the 250th. The value of π to the first 15 decimal places is 3·14159,26535,89793. Although indisputable demonstration is not wanting that π cannot be expressed in finite terms, we have still, every now and again, some self-styled mathematician giving to the world his so-called solution of what he deems the most important problem of the day. An instructive and entertaining account of these C.-squarers is to be found in De Morgan's *Budget of Paradoxes*.

In modern geometry, the C. is classed among the quadrics or curves of the second order, to which the ellipse, parabola, and hyperbola also belong. Its most general equation, referred to rectangular co-ordinates, is $(x-a)^2 + (y-b)^2 = r^2$, where a b are the co-ordinates of the centre, and r the length of the radius. Many of the properties of the C. can be extended to the sphere by the substitution of planes for straight lines; and this similarity is recognisable at once from their *quaternion* equations, which are identical, there being merely the further condition, in the case of the C., that it lies in one plane. See QUATERNIONS.

The *Curvature* (q. v.) of a C. is the same wherever you take it. Hence the curvature of a curve at any point is determined by drawing through this point the C. which has the same tangent, and the same ultimate deflection from the tangent, that the original curve has, since there is no other C. that can have a more perfect and higher degree of contact. This C. is called the *C. of curvature*, and its radius the *radius of curvature*. In practical life, the unit angle or *Degree* (q. v.) is that angle which is subtended by an arc, equal in length to the 1-360th part of the circumference of a C. of unit radius. The only truly scientific method is that known as the *circular measure* of angles, which depends upon the proposition that angles at the centre of a C. are proportional to the arcs upon which they stand. The unit, called a *radian* by Professor James Thomson, is that angle whose subtending arc is equal in length to the radius; hence two right angles are represented numerically by π, and one right angle or 90° by $\frac{\pi}{2}$. If θ be the circular measure of an angle of n degrees, the relation subsisting between these is given by the equation $\frac{\theta}{\pi} = \frac{n}{180°}$.

Circle, Magic, the charmed limits within which magicians and sorcerers, according to popular belief, were safe from the fury of the evil spirits whom their spells had raised. Described on a space of 9 sq. feet—7 was the number in the E.—there was an outer and an inner C., and the spaces between them, as well as in the angles of the square outside the larger one, were filled 'with all the holy names of God,' and other symbols, in which lay the potency of the charm.

Circle, Mural. See MURAL CIRCLE.

Circle, Quadrature of. See CIRCLE.

Circles of the Sphere. See ARMILLARY SPHERE.

Cir'cuits. England and Wales, except Middlesex, are for judicial purposes divided into C., which the fifteen judges visit twice or thrice a year, in pairs, to adjudge civil and criminal charges. The criminal charges for the county of Middlesex and city of London, and parts adjacent, are adjudged at sessions held monthly at the Central Criminal Court (see CRIMINAL COURT, CENTRAL); and the judges of the superior courts sit during term for the adjudication of civil cases only in Westminster Hall, and before and after term in the Guildhall of the city of London. The Lord Chancellor and the Vice-Chancellor also sit out of term at Lincoln's Inn. The circuit districts of England are eight—the Home, the Midland, the Norfolk, the Oxford, the Northern, the Western, the N. Wales and the S. Wales. In Ireland they are the N.E., the N.W., the Home, the Leinster, the Connaught, and the Munster. (See ASSIZE.) The Act of 1672 divides Scotland into three districts, in which C. are to be made by the justiciary judges. This regulation is affected by different statutes. The circuit courts of the southern district are directed to be held at Jedburgh, Dumfries, and Ayr; the western at Stirling, Inverary, and Glasgow; and the northern at Perth, Aberdeen, and Inverness. The court must remain at each place not fewer than three days, and no business begun at any of the places must be left unfinished. There are two C. in the year; one must be held between the 12th March and 12th May; the other is appointed to be held in the autumn. An additional criminal circuit has been appointed to be held at Glasgow during the Christmas recess of the Court of Session. Circuit courts are established in Scotland for the trial of small-debt causes by the sheriffs.

Cir'cular Dec'imals. See DECIMALS.

Circular Notes are a kind of bank-notes, which the chief banking-houses of the United Kingdom supply for the convenience of travellers abroad. They are of the value of ten pounds and upwards. No charge is usually made by the bank for commission, it making its profit on the interest arising on the purchase-money between the time of purchase and the date at which the bank is called on to cash the C. N. A French *Lettre d'Indication*, addressed to a long list of foreign bankers, is given along with the notes, which must be presented on discounting any of them. The traveller should sign this letter at once on receiving it, and put it in one repository and the notes in another; thus, if his notes are lost or stolen, they cannot be cashed if he retain the letter, and even though both letter and notes come into the possession of a dishonest person, the former being signed, there will be the difficulty of endorsing the notes with a sufficiently good imitation of the signature to the letter. Messrs Coutts & Co. of London have, we believe, the widest circle of foreign correspondents. They pay the foreign banker a small commission; the traveller is therefore entitled to the full rate of the discount of the day, without any charge for commission. In France, the usual rate of exchange is from 25·30 francs to 25·50 per £1—*i.e.*, 253 francs to 255 francs per £10 C. N. In Switzerland it is not commonly above 25·0 per £1. In Italy, the exchange *in paper* is about 25·8 to 25·95 per £1. (See *Exchanges*, in POLITICAL ECONOMY.) The traveller must be very careful about paper in Spain and Italy. He should take paper, because in paying his hotel-bills, if he pay in gold he will get no discount; but before quitting any place he must get quit of his *local* paper, as it is not current out of its locality. In leaving Turin for France or Switzerland, he must take care to have gold to pay his railway fare, as the railway will not accept paper, not even the paper of the National Bank of Italy. We consider the C. N. the most safe and convenient form of carrying money abroad, and we have never met with incivility. On one occasion, when the fault was our own, we found our passport from the Foreign Office very valuable. We recommend all travellers to carry a passport from the Foreign Office. See PASSPORT.

Circular Numbers are those whose powers all end in the same letter—that is, every number whose final letter is 1, 5, 6, or 0.

Circular Parts, the name given to two rules, invented by Napier, which facilitate the solution of right-angled spherical triangles. They may be found in any treatise on spherical trigonometry.

Circular Polarisa'tion. See POLARISATION.

Cir'culating Li'brary, a library of books lent on hire. In the middle ages the stationers of Paris were compelled to lend books to students at rates of charge fixed by the university. The first C. L. in England was established about 1740 by Samuel Fancourt, a Salisbury clergyman, and in 1748 there was a large C. L. in Crane Court, London. Allan Ramsay opened a C. L. in Edinburgh about 1725. The *London Library* was founded in 1841, and is now a very valuable institution. Circulating libraries are now common throughout the country. The largest in England is that of Mr Mudie, New Oxford Street, which was founded in 1842.

Circula'tion of the Blood. The blood is formed (1) from the chyle poured into it by the thoracic duct, (2) from the fluid and soluble matters absorbed by the blood-vessels of the alimentary canal, and (3) from the matter collected by the absorbents from all parts of the body, and elaborated by the lymphatic glands, called the *lymph*. (See BLOOD.) This fluid contains in it all the materials necessary for nourishing the various textures of the body; and, consequently, for the purposes of nutrition, and also for the purposes of respiration and excretion, it must be distributed throughout the body. It is in a state of constant movement in a definite direction, and the name given to this movement is the *C. of the B.*

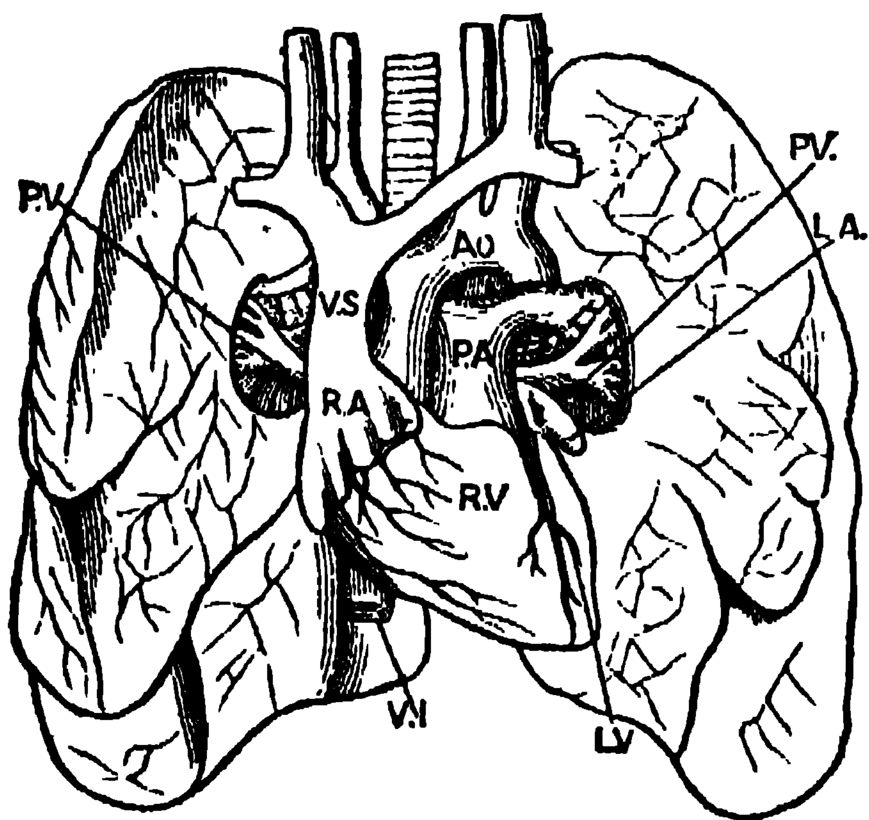
A description of the C. of the B., or nutritive fluid in the different great groups of the animal kingdom, will be found under such headings as AMPHIBIA, ANNULOSA, ANNULOIDA, CRUSTACEA, FISHES, MOLLUSCA, PROTOZOA, REPTILIA, and what will be detailed here will be the function as manifested in man, the mammalia, and birds.

History of the Discovery of C. of the B.—Hippocrates confounded veins and arteries under the general name of *phlebes*, the term *arteria*, artery, being applied by him only to the windpipe. Aristotle distinguished between arteries and veins, but supposed that the latter alone contained blood, which they carried outwards. The arteries were believed by him to be filled with air. Galen demonstrated that the arteries did not contain air, but blood. He thought, however, that there was a communication between the two sides of the heart through the septum. Vesalius pointed out that there was no such communication. Servetus showed that before the blood could pass from the right to the left side of the heart it must pass through the lungs. It was still thought, however, that blood passed from the heart outwards into the body by both arteries and veins. Fabricius ab Aquapendente showed that there were valves in many of the veins, so placed that the blood could only pass through these vessels *towards* the heart, not *from* it. At last the celebrated William Harvey appeared, and in 1628 he published his great work, *De Motu Cordis et Sanguinis*, which finally established our knowledge of the C. of the B., and which has always been regarded as one of the finest examples of purely experimental research and of inductive reasoning. He based his discovery, the greatest ever made in physiology, on the following considerations and facts:—(1) The continuity of the connections between heart, arteries, and veins; (2) that on dividing an artery blood spurted out from the end still connected with the heart, while on dividing a vein, blood flowed from the end furthest from the heart; (3) that when he applied a ligature to a vein, the vessel became swollen on the side of the ligature furthest from the heart; (4) on the arrangement of the valves in the heart and veins being such that it could flow only in a certain direction; and (5) that on calculating the amount of blood sent out from the heart along the arteries in a given time, it was found to be so great as to prove that a large proportion of it must return to the heart in that time, as there was not sufficient time either for the complete consumption of

the old, or for the formation of new blood, to keep up the supply. Still Harvey did not understand how the blood passed from the extremities of the arteries into the commencement of the veins. The capillaries were not then known. In 1661 Malpighi showed, by means of the simple microscope, the circulation in the web of the frog's foot. Thus it was shown that the blood passed from arteries to veins by the capillaries or intermediate vessels, and the discovery of the course of the circulation was complete.

The Organs of the Circulation.—These are the heart, arteries, veins, and capillaries. A description of the structure of the last three will be found under their respective headings, but in order to understand the C. of the B., it is necessary here to describe the heart.

The Heart.—This is an organ placed somewhat obliquely in the thorax. It is of a conical shape. The base is directed upwards, to the right, and somewhat backwards, and corresponds to the middle of the back. The apex is situated a little to the

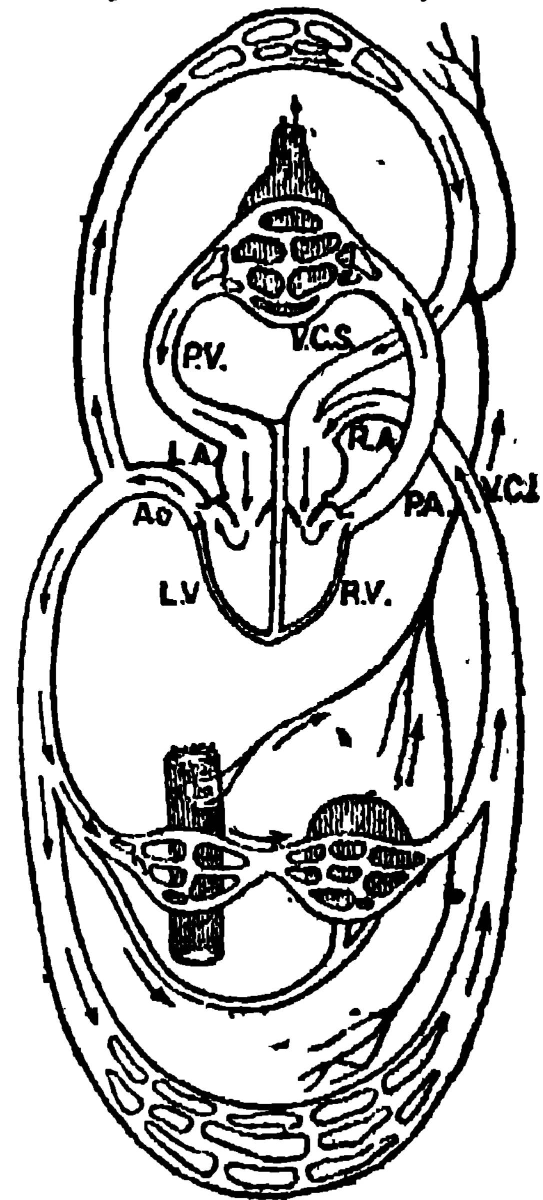


The Heart, Great Vessels, and Lungs.
(Front view.)

left of the breastbone, opposite the space between the fifth and sixth ribs, a little below the left nipple. The organ, in the human being, is about the size of the clenched fist, and in the male it weighs from 10 to 12 ounces, while in the average female it is somewhat lighter. The heart is divided into four cavities, two corresponding to the base, called the *auricles*, RA, LA, and two to the body and apex, known as the *ventricles*, RV, LV. The auricular part is separated from the ventricular by a transverse groove, called the *auriculo-ventricular* groove, in which lie the nutrient vessels of the organ. Two longitudinal furrows are also seen, one on the anterior, the other on the posterior surface of the heart, and indicating a division of the organ into a right and left half, each consisting of an auricle and a ventricle. When the thorax is opened, the right side is the part chiefly seen, the left resting on the diaphragm. The auricles are called *right* and *left auricles*, RA, LA, the ventricles, *right* and *left ventricles*, RV, LV. Into the right auricle two great vessels open, namely, the superior and inferior venæ cavæ, VS, VI, the former of which returns the blood from the head, neck, and upper extremities, while the latter does the same office for the abdominal and pelvic portions of the body, and the lower extremities. Into this cavity there are also numerous apertures of small veins belonging to the heart. The blood then passes into the right ventricle by an opening called the *right auriculo-ventricular* aperture, which is guarded by a valve called the *tricuspid*. The right ventricle is shut off from the left by the strong partition between the cavities. From the right ventricle there issues a large vessel, termed the *pulmonary artery*, PA, which conveys the blood to the lungs. At the orifice of this vessel there is a valve, termed *semilunar*, from its shape. After the blood has passed through the lungs (see RESPIRATION), it is returned to the left auricle of the heart by four pulmonary veins, PV. From the left auricle it then passes to the left ventricle. The left ventricle is longer than the right, and has much thicker walls. At the left of the base of this cavity is the oval opening from the left auricle known as the *left auriculo-ventricular opening*. In front, and to the right of this, there is a round aperture, the mouth of the aorta, Ao, the great trunk artery of the body. The left auriculo-ventricular opening has a valve known as the *mitral*, so termed from its fancied resemblance to a bishop's mitre, and the orifice of the aorta has a semilunar valve, resembling that seen in the pulmonary artery.

The cavities of the heart are lined by a serous membrane, called the *endocardium*, which is continuous with the lining membrane of the vascular system. The substance of the heart is composed of muscular fibres, which are remarkable for being striated, whilst they belong functionally to the class of involuntary muscles. (See MUSCLES.) They are arranged in a series of layers. According to Pettigrew, who has chiefly dissected the hearts of ruminants, seven layers enter into the composition of the walls of both ventricles—three external, three internal, and one intermediate between these two groups. He has also shown that certain fibres of the external layers are continuous with corresponding internal layers, thus forming a series of loops. This continuity occurs around the auriculo-ventricular orifices, and upon the septum, and at the apex of the ventricles. The fibres of the first or external layer are continuous with the deepest, those of the second with the sixth, those of the third with the fifth, while the fibres of the middle or fifth layers return as it were upon themselves. Again, he has shown that some fibres pass round both ventricles. The direction of the fibres changes as we proceed from without inwards; the external layer is very oblique, and in the right or left ventricle passes from right to left, from base to apex, of the heart; the next two layers are less oblique; the fourth layer is transverse; and in the three innermost layers the obliquity becomes greater as we pass inwards, and the direction is changed, so that the fibres pass from right to left, but now upwards, from apex to base.

Mode of Action of the Heart.—The right auricle, RA, receives the blood from the body by the inferior and superior venæ cavæ, VCI, VCS, and the left, LA, receives it from the lungs by the pulmonary veins, PV. When both auricles are full of blood, they contract and expel the blood from their cavities through the auriculo-ventricular orifices into the ventricles. The blood is prevented from passing backwards into the venæ cavæ, or pulmonary veins, by the pressure of the blood filling the lungs and venous system. The two auricles contract simultaneously. After the ventricles have filled completely, they also contract simultaneously, and force the blood from the right into the pulmonary artery, PA, and that from the left into the aorta, Ao. To prevent the blood from regurgitating into the auricles, the auriculo-ventricular orifices are guarded by valves already alluded to. The right possesses the tricuspid, while the left has the mitral. It is necessary to understand the mechanism of these valves, which is identical in both. Take, for example, the tricuspid. As its name indicates, it consists of three cusps. These are of a somewhat triangular shape, the base of the triangle being attached to a fibrous ring surrounding the auriculo-ventricular opening, while the margins are free. When these three cusps have their edges in opposition, the orifice is nearly closed. They are brought into apposition when the ventricle contracts by the blood behind them lifting them up, but when the ventricles are dilated, the cusps hang downwards into the cavity of the ventricles. It is evident that some provision must be made for preventing the cusps from being forced backwards into the auricle. This is accomplished as follows: To the ventricular surface of the cusps a number of delicate tendinous cords (*chordæ tendiniæ*) are attached. These are in continuation with small muscular papillæ (*musculi papillares*) springing from the wall of the ventricle. When the ventricular wall contracts, these papillæ also contract, and pull upon the cusps, when these are forced upwards in the manner already described, so as to keep them tense, and thus prevent the possibility of their being forced backwards into the auricles.



Course of the Circulation.
(Back view.)

We have now to consider how the blood is prevented from flowing backwards into the ventricles, during their relaxation, from the aorta, Ao, and pulmonary artery, PA. This is effected by the action of the semilunar valves placed in these vessels, near their junction with the ventricles, RV, LV. These valves are each composed of three semilunar segments, attached by their convex margins to the sides of the vessel, but free at their borders, which, during the flow of blood past them, are turned upwards in the direction of the vessel. In the middle of the free border there is a small fibrous nodule, the *corpus aurantii*, and by the apposition of the three *corpora aurantii*, the irregularly triangular space which would be left when the margins of the segments are brought into the same plane is completely filled up. Behind each segment a small dilatation or pouch is seen, termed the *sinus of Valsalva*, most distinct in the pulmonary artery. The mechanism of these valves is extremely simple. After the complete contraction of the ventricle by which it forces the blood into the vessel, it dilates. The walls of the vessels, being highly elastic, when relieved from the propelling or distending force (*vis a tergo*), recover themselves, and tend to push part of the blood backwards into the ventricles. But as it passes behind the segments of the semilunar valves, and fills the sinuses of Valsalva, the segments are pushed downwards as far as they will go, thus closing the lumen of the vessel and preventing regurgitation into the ventricles.

Cycle of the Actions of the Heart.—A complete action of the heart consists (1) of contraction of the auricles, (2) of a short pause, during which the auricles have begun slowly to dilate, (3) of contraction of the ventricles, and (4) of a long pause, during which the ventricles relax and become filled with blood which is flowing into them from the auricles. After the auricles have filled they again contract, and another cycle of actions is begun. It has been found that the time occupied by the contraction of the auricles is about equal to that of the short pause, and the time of the contraction of the ventricle to that of the long pause. If so, it is evident that in each cardiac cycle the muscular walls of the heart are relaxing as long as they are contracting; or, in other words, there are brief periods of rest equal to brief periods during which energy is being expended.

Sounds of the Heart.—When we listen over the cardiac region of the chest of a healthy person, we feel an impulse, and we hear two sounds like those occasioned by pronouncing in a medium pitch of voice the words *lupp dupp*. The first sound is dull, deep, prolonged, immediately precedes the pulse at the wrist, and is heard most distinctly over the apex of the heart. It is called the *first* or *systolic* or *inferior* sound, and it coincides with the contraction of the ventricle. It is due, or at all events coincident with, the combined effect of the four following actions:—(1) The contraction of the ventricles; (2) the rush of blood through the aortic and pulmonary orifices; (3) the flapping together of the auriculo-ventricular valves; and (4) the movement of the apex of the heart against the wall of the chest, caused by the change of form of the ventricular portion of the heart during its contraction. The second sound is sharp, short, superficial, and is heard with greatest distinctness over the base of the heart. It has been experimentally ascertained to be entirely due to the sudden closure of the semilunar valves in the way already described.

Forces Carrying on the Circulation.—1. The chief of these is the heart. 2. The next usually mentioned is the elasticity of the larger arteries, which effects (1) the gradual conversion of the pulsatile or wave-like movement into a uniform flow, and (2) diminishes the resistance the ventricle has to overcome. But it can scarcely be said that the elasticity of the vessels is a new force, as the amount of recoil, supposing the arteries to be perfectly elastic, will be exactly equal to the amount of distension caused by the action of the ventricles. The elasticity of the ventricles modifies the character of the flow of the blood rather than adds to the force for propelling it forwards. 3. By some it is contended that the attractive influence of the tissues in the meshes of the capillary system forms one of the forces of the circulation (*vis a fronte*). 4. The blood is propelled along the veins towards the heart by muscular pressure on their walls forcing the blood onwards, as it cannot pass backwards, on account of the pressure of the valves in these vessels, which open *towards* the heart. 5. Lastly, Burdon Sanderson and others have shown experimentally that inspiration, by diminishing pressure on the venæ cavæ, favours the flow of blood to the heart, and thereby increases the vigour of the succeeding contractions. See RESPIRATION.

Arterial and Cardiac Pressure.—By this is understood the force or pressure of the fluid on the inner surface of the heart or arteries during a contraction of the heart. It is measured by an apparatus termed a *kymograph* (see KYMOGRAPH), and it has been estimated in the human subject to be about 4 lbs. 4 oz. on the sq. inch. Now, if we assume the superficial area of the inner surface of the left ventricle, which has to propel the blood through the whole body, to be 13 inches, as has been determined to be the mean, it follows that when the walls of this cavity contract they do so with a force equal to about 52 lbs.

Rapidity of the Circulation.—There is no accurate method of measuring this. According to Vierordt, the blood flows in the carotid, an artery of the neck, at the rate of about 10½ inches in a second. In smaller arteries he estimated the speed as being much slower. Volkmann found in the carotid of the horse the rapidity to be 20·28 inches per second. According to Valentine and Weber, in the capillaries the rate is 1 inch per minute. All of these measurements are vague and unsatisfactory, and this most difficult problem is still unsolved.

Other details regarding the C. of the B. will be found under the following heads:—ARTERY, CAPILLARY, KYMOGRAPH, PULSE, SPHYGMOGRAPH, VEIN, VASOMOTOR SYSTEM.

Circulation of the Sap in Plants. See NUTRITION OF PLANTS.

Circumcis'ion (Lat. 'a cutting round,' *i.e.*, cutting off the prepuce), is a religious rite which has prevailed among various nations all over the world. It is probably a relic of nature-worship, and points back to the practice of offering human sacrifices to the God of Increase, or the reproductive principle in nature, the symbol of which was the Phallus. As civilisation advanced, instead of the whole victim, a significant part was offered by fire to the deity.

The idea long prevalent among Christians was that C. is and was exclusively a Jewish rite, and that it was given to Abraham as a token and seal of the covenant, the institution of which is described in Gen. xvii. This idea may now be considered to be abandoned; for it is capable of absolute demonstration that C. was practised among peoples well advanced in civilisation—*e.g.*, the Phœnicians and Egyptians—long before the ancestors of the Hebrews had left Mesopotamia. But Scripture does not say that C. was first made known to Abraham. In fact, it implies exactly the reverse. The passage in Genesis assumes a knowledge of the practice, and only represents it as transformed for the first time into a religious rite, and acquiring a symbolic meaning.

Circumduc'tion of the Term, in Scotch law, is the sentence of a judge declaring the time elapsed for leading proof in a case, after which no further evidence can be adduced.

Circum'ference, or **Periphery,** the curved boundary of a plane figure: when the boundary is made up more or less of straight lines, it is usually termed *perimeter*.

Circumnaviga'tion, the act of sailing round the world. This feat was performed first by Magalhæns (q. v.) in 1519. Drake (q. v.) accomplished it in 1577; and Captain Cook (q. v.) between the years 1768 and 1779 circumnavigated the globe no less than three times. In the present day it is frequently done, but not in the same way, nor in the same vessel. An Englishman who wishes to spend a year in visiting Australia, has only to go out by the overland route, or round the Cape of Good Hope, and return by San Francisco, the Pacific Railroad, and an Atlantic steamer; and he has performed what was once a daring and hazardous feat.

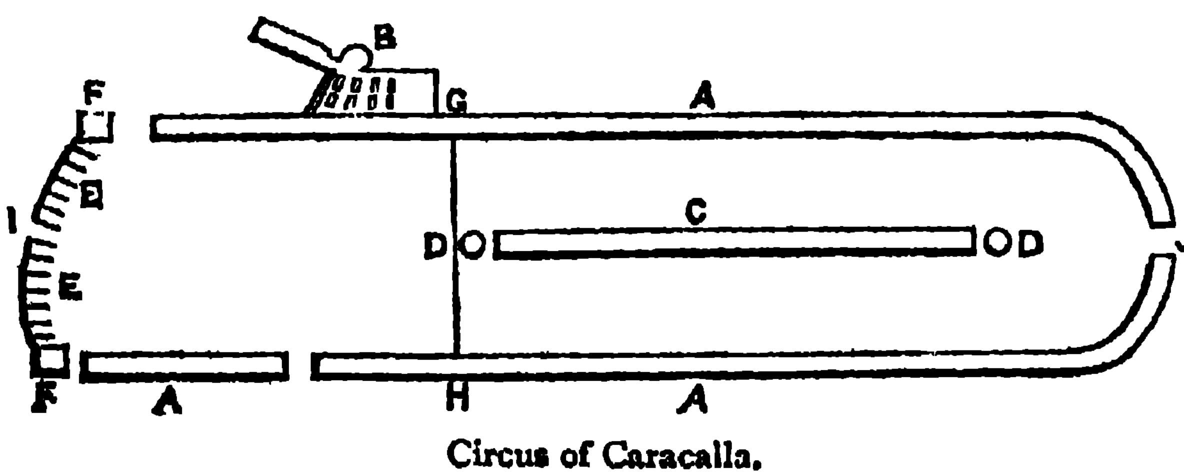
Circumstan'tial Evidence is evidence which—assuming it to be true—does not directly prove a question at issue, but indirectly tends to prove it. Thus if A swear that he saw B stab C, the evidence is direct; and if we believe A, the question of whether or not B stabbed C is disposed of. But if A swear that he saw B and C quarrelling on the day when C was stabbed, belief in A does not satisfy us of B's guilt; but it is C. E. of more or less weight. And if we have an accumulation of such items of evidence, they may, though there be no direct evidence, amount to conclusive proof of guilt. But if any one item of circumstantial proof depend on another, the two must only have the weight of one. Thus A swears that he sold to B the knife which D swears

that he found blood-stained near the murdered C. Here we have not two but only one item of proof, since if either A or D is swearing falsely, the testimony of the other is valueless against B. C. E. is in this better than direct evidence, that the witnesses to it can hardly combine to swear falsely without being detected. It is plainly impossible that any concatenation of circumstances should ever prove the innocence of one accused to be impossible. When the probability of innocence bears an appreciable ratio to that of guilt, according to the just principle of our law, the prisoner must be acquitted.

Circumvalla'tion (Lat. *circum*, 'about,' and *vallum*, 'a rampart'), in fortification, is a line of entrenchment thrown up by the besieging party round a place under siege, but facing outwards so as to resist attacks from the field.

Circumven'tion legally means deceit or fraud in making a bargain, or in procuring the making or execution of a deed. Either may be set aside by law if proved to have been entered into or done through C. It will not, however, be sufficient to prove that the act sought to be annulled is hurtful to the doer, or irrational on his part; for the law will not protect a man from the consequences of his own folly. It must be shown that deception was used towards him. If, however, the granter of a deed or maker of a will be of weak mind, a very slender circumstance or fraud may lead the law to set the deed or will aside.

Cir'cus, The, of ancient Rome, was a place in which chariot-races and other games were exhibited. The Circensian Games were believed by the later Romans to have been first instituted by Romulus, and were named *Consuales*, in honour of the god Consus. To Tarquinius Priscus was ascribed the construction in the Murcian Valley, between the Palatine and Aventine, of a building for such exhibitions, which was known by way of eminence as the *C. Maximus*. It was frequently repaired and extended, and was reconstructed by Julius Cæsar, in whose time it was three stadia (about 600 yards) long, one stadium wide, and the surrounding buildings half a stadium deep. At different periods of its history, it was computed to contain 150,000, 260,000, and 385,000 persons. Scarcely a vestige of it now remains; but an excellent idea of an ancient C. may be obtained from the remains of the Circus of Caracalla, the ground-plan of which is shown in the annexed woodcut. Around the lines AA were



Circus of Caracalla.

placed the seats, as in a theatre, the lowest being separated from the ground by a parapet or balcony. At B was probably the station of the emperor. Down the middle of the area ran a dwarf wall C, called the *spina*, decorated with emblematic devices, and terminating at either end in three wooden cylinders DD of a conical shape, called *metæ*, round which the rival chariots were driven. At the end EE were placed the stalls for the horses and chariots, called *carceres*, the usual number of which was twelve. The whole of this side of the C. was called *oppidum*, from its gates and towers, FF. From G to H stretched a chalked rope (*alba linea*), for the purpose of securing a fair start, by bringing all the horses abreast at the entrance of the course. There were in all five gates, of which the chief were the *Porta Pompæ* (I), through which the opening procession entered; the *Porta Triumphalis* (J), through which the victors departed; and the *Porta Libitensis*, through which the bodies of those killed in the games were carried out. The *Euripus* in the C. Maximus was a canal 10 feet wide round the bottom of the front balcony, formed by Julius Cæsar to protect the spectators during the wild-beast hunts. The shows exhibited in the C. were the races, of which the Romans were passionately fond at every period of their history; the *Ludus Trojæ*, a sort of sham-fight, by young men of rank on horseback; the *pugna*, the representation of a battle; gymnastic contests in running, leaping, &c.; the *venatio*, a fight of wild beasts with one another or with men; and the *naumachia*, or representation of a sea-fight. In the races four chariots usually entered, drawn by two or four horses. The extent of the course was seven times round the *spina*, and twenty-five races were run in each day.

Ciren'cester, or **Cic'ester,** a town of Gloucestershire, on the Churn, and on the Thames and Severn Canal, 17 miles S.E. of Gloucester, has some manufactures of woollens, carpets, and cutlery. It possesses a fine old church (St John's), and in the vicinity there is an agricultural college, founded in 1846. C. returns one member to Parliament. Pop. (1871) 7681. C., according to Henry of Huntingdon, was originally a British city, called *Caer-corin* ('camp on the Corin,' mod. Churn). It became the *Corinium* or *Corinum* of the Romans, and stood at the junction of five Roman roads. The English invaders added *ceaster*, to mark that it had been a military station; and the modern name is only a corruption of *Corinium-ceaster*. Canute held a council here in 1020. C. once possessed a fine abbey, founded by Henry I., but no remains are extant. The town was attacked by Rupert in 1642-43, and was afterwards captured by Essex. Traces of a fortified wall have been discovered, as also various Roman remains.

Cirrhop'oda, or **Cirrip'edia,** an order of lower Crustacea represented by the Barnacles (*Lepas*) and Sea-acorns (*Balanus*). These forms are distinguished by the fact that when adult they are fixed, being free-swimming in their young state. They are attached to fixed objects by the front part of the modified head; the first three joints of the head being enlarged, and enclosing the rest of the body. The larva or embryo fixes itself by means of a peculiar *cement* furnished by special glands, which consist of modified parts of the ovaries. The hinder part of the animal, with its twelve feet converted into *cirri* or tentacular organs (hence the name *Cirripedia*), can be protruded from within the shell with which it is provided, and the cirri subserve respiration and nutrition. The mouth is provided with mandibles and maxillæ, and a complete digestive system exists. No distinct heart is developed. The larva is a free-swimming body known as a *nauplius*, provided with antennæ, a single eye, and a dorsal carapace or shield. Subsequently twelve limbs are developed on the abdomen, and the antennæ become prehensile organs, whilst a pair of eyes now exist. The antennæ are next fixed to some rock or stone by the cement, the carapace becomes calcified to form the adult 'shell,' and the feet become the cirri of the fully grown and metamorphosed animal, which loses the eyes of the larval stage. The Barnacles (q. v.) (*Lepadidæ*) are stalked and possess peduncles, at the free end of which the body of the animal, contained within a shell, composed of calcareous plates, is found. The Balani (q. v.) or sea-acorns are sessile or unstalked, and fix themselves directly to rocks, their bodies being enclosed within shells composed each of six segments or pieces, and having the twelve divided cirri, capable of being protruded from or retracted at will within the aperture of the shell, which is closed by an *operculum*. All cirripedes are hermaphrodite, but, as shown by Darwin's researches, peculiar bodies termed *complementary males* are also developed, these latter being lodged, sometimes two, within the shell of each female (as in *Scalpellum*), and being destined simply to fertilise the ova of their female hosts.

Cirr'hus, or **Tendril,** is the name applied to the thread-like twining organs by which plants climb around others or up any support. They may be formed by various modifications of the leaves, as in the Pea tribe, *Fumaria capreolata*, *Methonica gloriosa*, various species of *Clematis*, &c. In other cases they may be thread-like leafless branches capable of coiling spirally. Some tendrils hook their tops round supporting objects, while others expand their tops into a flat disc, which clings to objects, and enables the plant to climb up in the same way as do the accessory rootlets of the Virginian creeper (*Ampelopsis*). The term 'C.' is applied in zoology to any curled filament, and also to the modified feet of the *Cirripedia*.

Cirr'us. See CLOUDS.

Cis, a Latin preposition, meaning 'on this side,' the opposite of *ultra* and *trans*, and prefixed to names of mountains and rivers to form adjectives of place: Cisalpine, 'on this side of the Alps,' the opposite of Transalpine, 'beyond the Alps; Cismontane, 'on this side of the mountain;' Ultramontane, 'on the further side of the mountain;' Cisrhenane, 'on this side of the Rhine;' Transrhenane, 'beyond the Rhine,' &c. It must be noted that

the standpoint of those who first used the term is Rome, or some place within the bounds of the Roman dominion.

Cisal'pine Republic, The, formed out of the Cispadane and Transpadane republics, was proclaimed by General Bonaparte, 28th June 1797, and recognised by Austria as an independent state at the peace of Campo-Formio. It comprehended Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona, Rovigo, Modena, Massa, and Carrara, Bologna, Ferrara, and Mesola. On the 22d October of the same year it received an accession of territory, and was divided into ten departments, with an area of 16,384 sq. miles, and a pop. of 3,500,000. The victories gained by the Russians and Austrians in 1799 produced a temporary dissolution of the republic, but it was re-established by Bonaparte after the decisive battle of Marengo. On January 25, 1802, it assumed the name of the Italian Republic, and was divided into thirteen departments, with Bonaparte for its president, a title exchanged in 1805 for that of King of Italy, held by him till 1814, when the so-called Kingdom of Italy was dissolved.

Cissampelos (Gr. 'ivy-vine'), a genus of plants of the natural order *Menispermaceæ*. The root of *C. Pareira*, the 'velvet leaf' of the W. Indies, Central America, and India, yields the '*Pareira brava*,' or 'Butua root' of the shops, extensively and beneficially used in diseases of the bladder and other urinary organs; at one time it was believed to be efficacious in breaking up stone in the bladder; other species are used as diuretics and tonics. The root of *C. obtecta* is used for making an intoxicating drink, while *C. glaberrima* and *C. ebracteata* may be classed among that category of plants which have been reputed as remedies for serpent-bites. The root contains an alkaloid, *Cissampelin*, to which it owes its active properties.

Ciss'oid (Gr. *kissos*, 'ivy,' and *eidos*, 'a shape') **of Di'ocles**, a curve invented by Diocles (a Greek geometrician of unknown date) for the solution of the duplication of the cube, and the insertion of two mean proportionals between two given straight lines. If, from the extremity of a diameter of a circle as origin, lines be drawn to meet the tangent at the other extremity, that point on each line whose distance from the origin is equal to the distance between the intersections of the line with the circle and tangent, lies on the C. Hence, taking the diameter as the axis of x, the equation of the curve in rectangular co-ordinates is $x^3 = (a - x) y^2$,—a being the length of the diameter. It has a cusp at the origin, and a point of inflexion at infinity. The space between the curve and its asymptote (the tangent of the circle) is triple the area of the circle. Newton, in his *Universal Arithmetic*, gives a mechanical method of describing this curve.

Cissus. See VITACEÆ.

Cister'cians, an order of monks founded in 1098 by Robert, abbot of the Benedictine monastery of Molesme in Burgundy, who retired with twenty companions to Citeaux (Lat. *Cistercium*), and there established the fraternity of C. The C., after degenerating, were reformed in the beginning of the 11th c. by St Bernard of Clairvaux, who founded ninety-two monasteries, and from whom the C. in France were known as Bernardines. After St Bernard's death, the C. shook off episcopal control and became very influential through Europe. They wore a white robe with a black scapulary. Their rule was austere. At first they shunned luxury, eat no flesh, slept on straw, and walked unshod. Among the various offshoots from the C. were the Recollets in Spain, the Feuillans or Bare-footed monks in France, and the Trappists of La Trappe in Normandy, who, in the 16th c., sank into dissolute banditti. In England and Scotland the C. were very numerous. In the reign of Henry VIII. there were in the former country seventy-five Cistercian abbeys, among which were Woburn, Tintern, Furness, Kirkstall, and Rievaux. The Scotch abbeys of Melrose, Dundrennan, Culross, Deer, &c., belonged to this order. In France the Cistercian Convent of Port Royal became famous in the Jansenist controversy. Since the French Revolution, the C. have had few convents in Europe. The first vol. of a history of the C. by Father Janauschek appeared at Vindobonæ in 1877.

Cis'tern, a vessel for storing water or other liquid, with apparatus for regulating its supply and discharge. The kind most extensively in use is of wood lined inside with lead soldered at the angles. Cast-iron in one piece for small cisterns, and for large, in plates joined with flanges and bolts, and made water-tight with cement, is also employed, notably for water-tanks at railway stations. Very efficient and cheap cisterns are likewise made of slate slabs.

Cis'tus, or **Rock-Rose**, a genus of Dicotyledonous plants, belonging to the natural order *Cistaceæ*, to which it gives its name, shrubs, natives of Southern and Western Europe, N. Africa, and the Canary Islands. From the leaves and branches of *C. Creticus* exudes the ladanum or labdanum gum of Crete. In that island it is collected by means of a kind of rake 'with a double row of long leathern straps, employed in the heat of the day when not a breath of wind is stirring. Seven or eight country fellows, in their shirts and drawers, whip the plants with these straps, which, by rubbing against the leaves, lick off a sort of odoriferous glue sticking to the foliage. At one time, it is said that it was gathered from the beards of goats who had been browsing on the foliage. It is now used as a perfume, but it was formerly esteemed as a stimulant and expectorant in the cure of the plague, and as a constituent in plasters. The ladanum of Spain and Portugal is chiefly derived from *C. ladaniferus*, and is said to be obtained by boiling in water the summits of the branches. It has somewhat similar properties to the former, but is not in such high repute. Many of the species of C. are cultivated in our gardens, *e.g.*, *C. ladaniferus*, *C. cyprius* (often confounded with the former), *C. virginatus* of Teneriffe, &c. Altogether there are about 200 species known, a number of which are figured in Sweet's '*Cistineæ*.' *Helianthemum vulgare*, the 'rock-rose,' a common little plant on dry ground, and remarkable for the irritability of the stamens, is the only species of the genus found as far N. as Scotland.


Cistus.

Cit'adel (Fr. *citadelle*, from Ital. *cittadella*, 'a little city'), a fort serving the double purpose of keeping in subjection the inhabitants of the town or city in or near which it stands, and, in case of a siege, of forming a stronghold to shelter the defenders after the rest of the town has been taken. The C. is always built in a space clear of buildings, and commands the entire fortifications of the city or town.

Cita'tion is the act of calling upon a party to appear in court to answer to an action, to give evidence, or to perform some other judicial act. In England the term is chiefly used in the ecclesiastical courts. In Scotland C. is done by an officer of the court, or by a Messenger-at-Arms (q. v.) under warrant. When a party is not in Scotland, but under the jurisdiction of the Court of Session, he is cited edictally; formerly this was by a citation published at the market-cross of Edinburgh and on the shore and pier of Leith; but now it is done by leaving a copy at the office of the keeper of Edictal Citations (q. v.). Lists of citations are printed and published. In criminal cases it is not sufficient that the party appear voluntarily. He *must* be brought into court in regular form, and he can plead any omission of form, even though he has consented to it. Prescription (q. v.), positive or negative, in a process may be interrupted by C.

Cities of Refuge were six Levitical cities—namely, Kedesh, Shechem, and Hebron on the W. side of Jordan, and Bezer, Ramoth, and Golan on the E. side—appointed as a refuge to which the manslayer might flee from the Avenger of Blood (q. v.), and where he was protected till he could be tried by the authorities of his own city. If it was found on his trial that the deed had been involuntary, he was taken back to the C. of R., and on the death of the high priest, could return in safety to his home. The right of sanctuary was also possessed by many Greek and Roman cities, especially Ephesus, and by many churches in the middle ages—a privilege which was often too much abused, by letting real criminals escape.

Cit'izen (Old Eng. *citezaine* and *cyteseyne*, from the Old French form of *citoien*, and that from Low Lat. *civitadanus*, a derivative from *civitas*). Neither *C.* nor *city* is a word of definite meaning in modern Britain. The *civitas* of the Romans, which

was a central corporation governing inferior ones of a like kind, was unknown here. Some burghs were called cities because they were royal residences, others because a bishop's cathedral stood there. Thus St Andrews and Glasgow in Scotland, though mere burghs of barony, were called cities, and their inhabitants citizens. In Athens, citizens had the privilege of receiving a *theoricon*, or two oboli to each, as entrance money to the theatres; each C. who attended the ecclesia or public assembly received three oboli about fifty days in every year; every member of the *boulè* or senate, a drachma a day about 300 days in every year; besides, the freemen who served as jurymen or dicasts in the courts of justice received daily pay from the public treasury. The resident aliens were compelled to pay a capitation tax of twelve drachms and to choose patrons; and there was a large body of slaves. Such state donations were, however, rare. At Rome we find *civitas* along with *libertas* and *familia* making up the notion of *status*. Freemen were divided into *cives* and *peregrini*. The rights of cives were—(1) the *jus suffragii*, electoral and legislative power; (2) *jus honorum*, capacity for office; (3) *jus commercii*, or full rights in property; and (4) *jus connubii*, full rights in marriage. Aliens enjoyed only numbers (3) and (4), and these only in a limited way. An intermediate class, Latini, enjoyed number (3) fully. These rights were liable to be lost by the various modes of degradation (*capitis minutio*), and the political rights *suffragium* and *honores* were forfeited by infamy (*infamia*) or loss of civic honour (*existimatio*). Although the imperial revenue consisted to a great extent of provincial tributes, Roman citizens had after the time of Augustus to pay customs on most imported articles, an excise not exceeding 1 per cent. on all articles sold in the home markets, a tax of 5 per cent. on legacies and successions. Caracalla did not exempt from tribute where a subject became a C., and citizenship thus became a burden instead of a privilege. The Roman army felt insulted when addressed as 'citizens.' All political significance had, of course, left the term, and the state at last supported its citizens by distributions of corn and largesse, and by giving gratuitous spectacles. The Italian cities were generally administered by a *curia* or municipal senate elected by the people, and *duumvirs* or annual consuls. In the 9th c. these cities began to rebuild their walls; and after the War of Investiture many were able to recover a jurisdiction and corporate life independent on their feudal surroundings. They had the parliament or general meeting of citizens for election; their *gonfaloniere* and *barroccio* of the town militia; the secret financial council, or *consilio di credenza;* the *signorias*, or municipal magistrates. The feudal lord frequently became a burgess. These free Italian cities formed a league against Barbarossa, and by the treaty of Constance (1183) all their previous privileges and immunities were confirmed, although the Emperor reserved a full right of sovereignty over most of them. Charters of immunity and franchise began to be granted in France in the reign of Louis le Gros. These were distinct from the early charters freeing serfs and fixing their feudal payments; they made careful provision for the security of the person and property of citizens, on the principle of a common responsibility and of joint contribution to the expenses of defence and justice. The term C. was used universally during the French Revolution to express the complete political equality of all Frenchmen. In the municipal constitution of Brissot the electoral right was confined to the *citoyens actifs—i.e.*, those paying a *marc d'argent*, or yearly tax equal to three days' labour In America the term has been used with a similar connotation. Christian thought has dwelt much on the conception of the *Civitas Dei*, or invisible spiritual kingdom, embracing as citizens all devout Christians.

Cit'ric Acid is a colourless crystalline compound contained in the juice of lemons, oranges, gooseberries, tamarinds, and in most acidulous fruits, and was first isolated by Scheele in 1784. C. A. is usually prepared from lemon-juice. The juice is allowed to remain for some time undisturbed, when fermentation sets in and mucilaginous substances separate: the clear liquid is decanted from these, neutralised with chalk, and then boiled with lime, when insoluble citrate of calcium is deposited; this is washed with cold water, decomposed by the proper quantity of sulphuric acid, and the solution of C. A. which results, after being syphoned off from the insoluble sulphate of lime, is evaporated to the proper concentration and allowed to crystallise. C. A. crystallises with one molecule of water of crystallisation, and has the composition expressed by the formula $C_6H_8O_7,H_2O$. It has a pleasant acid taste, readily dissolves in water and in alcohol, and forms salts in which one, two, or three atoms of its hydrogen are replaced by metals; it is therefore a tribasic acid. C. A. is used by the calico-printer to discharge the mordant from cloth, and in the manufacture of bright colouring matters from cochenille and safflower. It is also used in medicine. Lime-juice is always given on board ship to sailors as an antiscorbutic. C. A. is also employed in the manufacture of effervescing powders, lemonade, &c.

Cit'ron (*Citrus medica*), a tree cultivated in Southern Europe, but a native of the N. of India, belonging to the natural order *Aurantiaceæ* (q. v.) (the Orange family). By some botanists it is looked upon as a variety, or even as the type of the various plants which we now distinguish by the names of orange, lemon, shaddock, and lime, an opinion which Dr Lindley was inclined to adopt (*Journ. Horticultural Society*, ix. [illegible]1). It has, however, been cultivated in Europe since the earliest period of the Christian era, or even earlier, and is now naturalised in most countries the climate of which is suitable for its growth. There are many cultivated varieties, distinguished by the shape, &c., of the fruits. In China, the variety known as the 'five-fingered C.' has the lobes separated into finger-like divisions. The pulp of the C. is cooling, but it is for the rind, which is made into a preserve, that the fruit is chiefly valued, and it may be said that it is used for the same purposes as the fruit of the lemon. From the *cedrate* variety of the C., oil of cedrate, greatly valued by the perfumers, is obtained. C. is frequently cultivated in Great Britain. It is believed that the word which the translators of the Bible have rendered 'apple' would in most places be more appropriately translated C.

Citros'ma, a genus of trees of the natural order *Monimiaceæ*, containing about fifty species, all natives of tropical S. America. The leaves are covered with glands, which secrete an oil with a citron-like odour; hence some of the species are called *Lemoncillo*, or 'little lemons,' the fruit being only about the size of a pea when ripe.

Citrull'us. See Colocynth.

Cit'rus, a genus of plants of the natural order *Aurantiaceæ*, consisting of trees and shrubs, natives of India and of the warmer parts of Asia, though also extensively cultivated in America, Southern Europe and other warm regions, for the sake of their fruits. The flowers are very fragrant, and, like the leaves and rind of the fruit, abound in a volatile oil. Among the best-known fruits referred to the genus C. are the Citron (q. v.), Orange (q. v.), Lemon (q. v.), Lime (q. v.), Bergamot (q. v.), Shaddock (q. v.), Pompelmoose (q. v.), Forbidden Fruit (q. v.).

Citta', the Italian form of *city*, enters into the composition of many names of places in Italy, of which may be noted:—

Cittadella ('little town'), a walled town in the province of Venice, N. Italy, on the Brentella, 14 miles N.E. of Vicenza; has woollen-cloth and paper mills. Pop. 6600.

Citta di Castello ('castle town'), the *Tiphernum Tiberinum* of the Romans, a town in the province of Perugia, Central Italy, on the Tiber, 12 miles N. of Arezzo; has some manufactures of silk-twist, &c. It is chiefly notable in connection with Raphael, who painted many of his earlier pictures here. The town has many rare Gothic churches and other fine buildings. Pop. 22,916.

Others will be found under Civita.

Cit'y, a term introduced about the time of the Norman conquest. The word is derived from the Latin *civitas*, and is not limited in its application to episcopal towns. It is applicable to all towns of eminence, signifying that they are subject to municipal government. Long after the conquest, C. is used synonymously with *burgh*, as appears in the charter of Leicester, it being called *Civitas Burgus*, which shows that it is an error to suppose the term to be only applicable to a town which 'either is or has been the see of a bishop.' On this point Mr Woodeson, the Vinerian Professor, has adduced a decisive authority. It is that of Ingulphus, who relates that at the great council assembled in 1072 to settle the claims of two archbishops, it was decreed that bishops' sees should be transferred from *towns* to *cities*. In London, when 'the C.' is spoken of, it denotes the mercantile quarter of the town E. of Temple Bar. In America, the term

is applied to all incorporated towns governed by a mayor and aldermen.

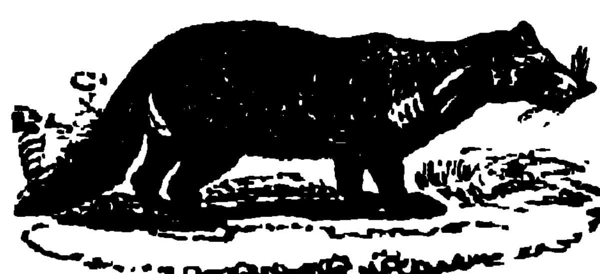
Ciudad', the Spanish form of the Lat. *civitas*, enters into the composition of many names of places both in Spain and her colonies. The most important are :—

CIUDADE'LA, a walled town of Minorca, on the N.W. coast of the island, 30 miles N.E. of Port Mahon, has some woollen manufactures, and a trade in agricultural produce. Its cathedral is an imposing structure. Pop. 7000.

CIUDAD REAL' ('the royal city'), the capital of a province of the same name, Spain, between the rivers Jabalon and Guadiana, 100 miles S. of Madrid, with which it is connected by railway. It has several famous Gothic churches, a public square of 150 by 75 paces, some manufactures of woollens, leather, tablecloths, &c., and a trade in wine, oil, fruits, and mules. Pop. 10,500.—The *province* of C. R. occupies the S. of New Castile, and has an area of 7840 square miles, and a pop. (1870) of 264,649.

CIUDAD ROD'RIGO ('city of Rodrigo'), a strongly fortified town in the province of Salamanca, Spain, overlooks the Agueda, 50 miles S.W. of Salamanca, has a citadel, a cathedral, part of which was erected in the 12th c., and several fine churches. In the Plaza Mayor are three Roman columns bearing inscriptions. The river is here spanned by a magnificent bridge. Pop. 4850. As a key to the W. of Spain, C. R. was a place of great importance during the Peninsular War. The French captured it in 1810, and the British besieged it for eleven days, and eventually carried it by storm in one of their most brilliant actions, January 20, 1812.

Civ'et (*Viverra*), a genus of Carnivorous mammalia included in the family *Viverridæ*, which, from their applying part of the sole of the foot to the ground in walking, have been named *Semi-plantigrada*. They are of moderate size. The muzzle is sharp and the tail long. The flesh-tooth has a cutting edge, and the canines are sharp, long, and pointed. The tongue is roughened with numerous sharp papillæ. The claws can be partly retracted. The pupils of the eyes can contract very markedly on being exposed to light. The *Viverra civetta* of N. Africa, or C.-cat, is the most familiar species. It is nocturnal in habits, and supplies the 'C.' of commerce, in the form of a pomade-like secretion, elaborated by a double pouch present in both sexes, and placed close to the anus. (See ANAL GLANDS.) This substance is used in the manufacture of perfumes, and is removed periodically from the secreting glands. The genette (*V. genetta*) inhabits N. Africa and S. Europe, and may be domesticated like a cat. The food consists of raw flesh of various kinds. The common C. attains an average length of about 10 inches, and is coloured a brownish grey with black markings. The last-mentioned species does not afford 'C.'



The Civet.

Cividale ('the little town'), the ancient *Forum Julii*, a walled town of Undine, N. Italy, on the Natisone, 8 miles E.N.E. of Udine. The cathedral of Santa Maria, built in the 8th c., has several fine paintings and a beautiful altar-screen. Its museum of antiquities and the municipal archives are rich in old and valuable MSS. C. carries on silk, cotton, and linen manufactures. Pop. about 6812.

Civ'il Death occurs when a person alive, or possibly alive, is adjudged dead by the law. Those attainted of treason or felony are, with exceptions, held to be civilly dead. A presumption exists in favour of life for a reasonable number of years, so as to throw the *onus probandi* on the party alleging death. But this presumption may be overcome by a counter presumption of death arising from circumstances. No general rule can be given on this point. See *Dickson on Evidence*, p. 183, *et seq.*

Civil Engineer, strictly every engineer not connected with the army—every engineer, that is, not a military engineer—but in common usage a man who makes or designs railways, docks, roads, canals, &c., as distinct from a *mechanical engineer*, a man who makes engines, boilers, and machinery in general. See ENGINEER.

Civil Establishments. Certain public departments of civil organisation, but provided for by the army estimates, are so called.

Civil'ian. This word has three meanings, two of which are legal. In the law, it may denote one versed in the principles and rules which form the basis of civil rights, or it may denote one who has specially studied these principles and rules as they appeared in the laws and government of ancient Rome. In a popular sense, a C. is one whose vocation is neither clerical nor military.

Civil Law. See LAW.

Civil List. Previous to the Restoration in 1660, the civil and military expenses of the state in England were paid out of what was called the royal revenue. This arose from crown lands, and from forced loans, or taxation by the will of the sovereign. (See BENEVOLENCE, SHIP-MONEY, TONNAGE AND POUNDAGE.) At the Restoration the expenditure was divided into two branches, the military and the extraordinary, and the ordinary for maintaining the civil establishments of the country; the revenues appropriated to the latter being called the hereditary or C. L. revenues. They were derived from the crown lands, and from taxes voted by Parliament at the beginning of each reign. In the reign of William III. the C. L. amounted to £680,000 a year. It went on increasing during the reigns of the Georges. In 1812 it amounted to £1,080,000 independent of annuities to members of the royal family paid out of the Consolidated Fund (q. v.). In the reign of William IV. the C. L. charges were confined to the expenses of the King's household, secret-service money, and pensions. These were fixed at £510,000 a year. At the beginning of the present reign, a C. L. was settled upon Her Majesty for life of £385,000 a year, of which £60,000 is for the privy purse. In return for this grant, it was provided that the hereditary revenue should be carried to the Consolidated Fund. By the C. L. Act, 1 and 2 Vict. c. 2, Her Majesty is empowered to grant pensions to the amount of £1200 a year, chargeable on the C. L. revenues, to those having fair claims on the royal beneficence, or who, by service or discovery, have earned the gratitude of their country.

Civil Service. The paid service of the state which is not military or naval is called the C. S. Appointments in it were formerly under patronage, but in June 1870 an Order in Council was issued by which the home C. S. was in a great measure opened to public competition. Success in examination is not in itself a guarantee for permanent employment. A six months' probation is necessary, and should the candidate during this time not satisfy the chief of the department in which he has been placed, the appointment will be cancelled. The C. S. Commissioners hold examinations in London, Edinburgh, and Dublin, on days which are previously advertised in the principal newspapers. Persons wishing to become candidates must apply to the C. S. Commissioners by letter in their own handwriting, addressed to the office in Cannon Row, Westminster, for permission to attend the preliminary examination, at least ten days before the day named. On receipt of this application, requisite instructions are supplied. Before being allowed to compete, candidates must satisfy the Commissioners that they are natural-born subjects of the Queen, and that, for the first-class examinations, they are not less than eighteen or more than twenty-four years of age on the first day of the competitive examination. For the second-class examinations the limits of age are sixteen and twenty. Candidates must produce certificates of good health and character. They may compete without reference to any special office vacant, or the competition may be for a special office. Appointments may now be obtained by successful candidates in the Treasury, Privy Council Office, Colonial Office, India Office, War Office, Admiralty, Board of Trade, Poor-Law Board, Customs, Inland Revenue, General Post-Office, and a great many other Government offices. The most important and lucrative department, however, of the C. S. open to competition is that of the C. S. of India. In this the successful candidate will at once, on arrival in India, receive a salary of 3000 rupees or £300 a year; his promotion, with good conduct and practical capability on his part, will probably be rapid, the salaries rising not by tens or twenties, but by hundreds of pounds per annum, until they reach the maximum. The highest salaries are those of the judges of the Sudder Courts,

£5000 a year. In the Forest Service of India there are also valuable appointments open to public competition. The India Public Works Department is one of the most important branches of the Indian C. S. The civilian officers are passed students of Government Civil Engineering Colleges in England and India, and civil engineers in practice of approved qualifications appointed direct by the Secretary of State or Government of India. The Indian Civil Engineering College at Cooper's Hill, Surrey, was established in 1870 for the education of civil engineers for this department. Admission to the college is obtained by competitive examination. In the Colonies also there are valuable C. S. appointments open to public competition. The more important departments of the C. S. of the United Kingdom, India and the Colonies are described under their titles in this work. For a description of the nature of the competitive examinations, see article EXAMINATIONS FOR THE C. S. See *Guide to Employment in the C. S.*, by J. D. Morell, LL.D., London.

Civil Service Estimates include all the expenses of the state, except those included in the estimates for the army and navy, and the interest on the National Debt. They come to about £12,000,000 a year. They are voted by the House of Commons in Committee. See REVENUE, PUBLIC.

Civ'ita, an older and fuller form of Citta (q. v.), and similarly used. The most important towns of whose names it forms part are:—

CIV'ITA CASTELLA'NA ('the castled town'), a town in the province of Latium, Central Italy, 28 miles N. of Rome, on the site of the ancient *Falerium Vetus*, and containing numerous Etruscan remains. It is built on a steep hill near the Rio Maggiore, here crossed by a bridge 150 feet in height, and has a cathedral (1210) with beautiful mosaics, a very remarkable crypt, and wonderful altar figures of the 15th c., a college, and a citadel, which has been converted into a state prison. Pop. about 4000.

CIVITA DI PENN'E ('the city of the summit or pen'), the ancient *Pinna Vestina* (the chief city of the Vestini), a town in the province of Teramo, Central Italy, 29 miles E. by N. of Aquila. The cathedral and diocesan seminary are handsome edifices, but the town is in general ill-built. C. has a manufactory of silk-flowers, a dyework, and a tannery. Pop. 9800.

CIVITANUO'VA ('new town'), a commercial town of Central Italy, province of Macerata, in what was formerly designated the Marches, 12 miles W. of Macerata, with a commodious harbour on the Adriatic, at a short distance from the town. Vines and olives are produced abundantly in the neighbourhood, which also possesses rich pastures. Pop. of town and port, 8583.

CIVITA SAN-AN'GELO, a town in the province of Teramo, Central Italy, 25 miles S.E. of Teramo, and near the Adriatic. It has considerable trade, and a pop. of about 7000.

CIVITA VEC'CHIA, a city, fortress, and free port in the Italian province of Latium or Roma, on the Mediterranean, 38 miles N.W. of Rome, with which it is connected by railway. Its harbour, which is strongly fortified, is formed by two semicircular moles and an exterior breakwater, has at its southern extremity a lighthouse 74 feet above the sea-level, and has depth of water for vessels of 400 and 500 tons. The streets, narrow but regular, are well built. C. V. is the seat of a bishop, has an arsenal, shipyards, and magazines, and a large prison for convicts. It has communication by steam with Marseille, Genoa, Leghorn, Naples, Messina, Malta, Greece, Egypt, and Turkey. Pop. 8000. C. V. is the ancient *Centumcellæ*. It was greatly enlarged by Trajan, in honour of whom it was also called *Portus Trajani*. In the reign of Justinian it became a bone of contention between Greeks and Ostrogoths. Often plundered and destroyed, it always rose again from its ruins. The place obtained its present name ('the old city') after its destruction by the Saracens in 812, when the inhabitants withdrew into the interior and founded a 'new city.'

CIVITELL'A DEL TRONTO ('the little town of the Tronto'), a strongly fortified town in the province of Teramo, Central Italy, 9 miles N. of Teramo, situated on a rock on an affluent of the Tronto. It is noted historically for two events: the defeat of the forces of Pope Leo. IX. and the Emperor Heinrich III. by the Norman Guiscard in 1053, and its successful defence against the Duke of Guise at the head of a French and Papal army in 1557. Pop. 6690.

Clackmann'an (Gael. *clach* or *clachan Mannan*, 'the stone circle or village of Mannan,' an ancient district of Scotland), the capital of Clackmannanshire, on the Devon, near its junction with the Forth, 29 miles N.W. of Edinburgh. Pop. (1871) 1309. It was formerly a royal burgh, and in 1330 was the residence of King David Bruce. Many objects in the neighbourhood bear testimony to this fact, as 'the King's stone,' &c. Though C. is the county town, the courts are held at Alloa.

Clackmann'anshire, the smallest county in Scotland, 16 miles long from E. to W., and 8 broad from N. to S., bounded N. and W. by Perthshire, E. by Perthshire and Fifeshire, and S. by the Forth. The Ochil Hills occupy the N. part of the county, but the remainder, consisting principally of the valley of the N. Devon, is very fertile and produces heavy crops. Area, 31,876 statute acres, or 50 sq. miles; pop. (1871) 23,747. The Ochils, which are composed principally of trap, rise in Bencleugh to 2352 feet. The total acreage under crop, in bare fallow and grass, in 1875, was: corn crops, 5844 acres; green crops, 1463; grasses under rotation, 2876; permanent pasture, exclusive of heath or mountain land is 5311. Wheat and barley are cultivated in nearly equal proportions, in each case to about the third of the quantity of the oats sown. Beans are a heavy and favourite crop. The minerals are iron, limestone, and coal, which is found in abundance. The chief manufactures are woollens, especially tartans and tweeds, glass, earthenware, and bricks. The most important town in the county is Alloa (q. v.); but the village of Dollar (q. v.) is also widely known in Scotland as a seat of education. C., which is divided into four parishes, returns one member to Parliament in conjunction with Kinross-shire.

Clad'ium (Gr. *klados*, 'a branch or twig'), a genus of plants of the order *Caperaceæ*. One species (*C. mariscus*) is common on the bogs and marshes of some parts of Britain; for example, Cambridgeshire, where hundreds of acres are covered with it. It is used for thatching and lighting fires. It is the most northerly of its genus, the twenty-one species described (Steudel's *Plantæ Cyperaceæ*) having an extended geographical distribution, though the majority are natives of Australia.

Cladodystroph'ia (Gr. *klados*, 'a branch,' and *dustrophos*, 'hard to rear'), a disease of aged oaks and other trees growing in a light soil, in which the upper branches are more imperfectly nourished than the lower, and therefore sooner decay—in other words, become what is called 'stag-headed.' It has been supposed that this is in consequence of the decay of the tap root, possibly from the attacks of fungi, but Mr Berkley considers this mere conjecture.

Clado'nia. See REINDEER MOSS.

Cladopto'sis (Gr. 'a falling away of the twig'), a disease of oaks, willows, and other forest trees, in which the small branches snap off with a regular circular fissure, leaving a cup-shaped scar, somewhat similar to that which takes place when a leaf or fruit separates at the stalk. It appears to be somewhat similar to the disease to which vine branches are subject after a cold summer, and which is known as *Phriganoptosis*. The branches fall off, 'a process facilitated by the peculiar formation of the stem, there being a transverse layer of cellular tissue at each bud' (Berkley).

Claim, in law, is a demand of right in something which is not possessed by the claimant.

Claim of Liberty is a petition to the Queen in the Court of Exchequer for confirmation of liberties and franchises. See LIBERTY, FRANCHISE.

Claim on a Bankrupt Estate.—To enable a Scotch creditor to prove under a fiat issued against an English trader, he must forward to his agent in England an affidavit setting forth fully the nature of his debt, accompanied by the securities, if any, held by the creditor, and a copy of the account, if any, between the parties. To rank under a Scotch sequestration, the claimant must describe distinctly the ground of his debt, accompanying his C. with an oath of verity, specifying every security which the claimant holds for the debt.

Clair, St, a lake, 30 miles long by 12 broad, between Lakes Huron and Erie, with the former of which it is united by the river St Clair, which is merely the outlet of Lake Huron.

Clairac', a town in the department of Lot-et-Garonne, France, on the Lot, 16 miles N.W. of Agen, has some manufactures of paper and leather, and a trade in wine and fruits. Pop.

(1872) 2423. C. accepted the Reformation doctrines as early as 1527, and suffered greatly during the religious wars, more especially in the year 1621.

Clairaut, Alexis Claude, a distinguished French mathematician, was born May 7, 1713, at Paris, where he died May 17, 1765. At the early age of eighteen he was admitted to the Academy of Sciences, to the scientific journal of which he contributed many elaborate and original papers. His most famous works are his *Théorie sur la Figure de la Terre* (1743), his *Théorie de la Lune* (1752), and his *Théorie du Mouvement des Comètes* (1760). His *Problème des Trois Corps* is to this day one of the most profound specimens of analysis in existence.

Clairvaux' (Lat. *Clara Vallis*, 'bright valley'), a small village of France, in the department of Aube, on the left bank of the river Aube, 7 miles E. of Bar-sur-Aube, derives its origin and its name from the celebrated Cistercian abbey founded here by St Bernard in 1115. The abbey had at one time an annual revenue of 120,000 livres. It was suppressed at the Revolution, and its extensive buildings are now used as a house of correction and workhouse.

Clairvoy'ance (Fr. 'clear-seeing') is a term applied to a faculty supposed by the vulgar to be possessed by certain parties, in virtue of which they can see in the dark, describe objects they may have never seen with the naked eye, but which they are conjectured to see mentally, and by which also they can describe objects separated from them by any opaque substance or enclosed in a box. It is said to be possessed by spiritual 'mediums,' and by people under mesmeric influences. Of such a faculty there is no scientific proof, for in all cases the pretensions of the clairvoyant break down when submitted to searching inquiry by men who are acquainted with all probable sources of fallacy, and who bring to bear upon them the acumen and caution with which a successful lawyer investigates a case. C. is cleverly imitated by conjurors by means of a language of signs known only to the conjuror and the reputed clairvoyant. See MESMERISM.

Clam, in heraldry, an escalop or cockleshell, indicating that the bearer has been a crusader or has made long voyages at sea.

Clamshell and **Clam Bear's Paw**, the names applied to various genera of Lamellibranchiate molluscs, included in the family *Chamidæ*. (See CHAMA.) The C. (*Tridacna gigas*) attains gigantic dimensions, and in some cases the shell alone may weigh 500 lbs. The C. B. P. (*Hippopus maculatus*) is found in the South Seas; its whitish colour, spotted with red or purple, and its ribbed and triangular form, placing it in high favour for beauty among conchologists.

Clan. This Gaelic word, meaning 'children,' inferentially descendants of a common ancestor, has come to be applied almost exclusively to the communities of the Scottish Highlands, as these are divided topographically, and by distinctive surnames. The peculiarities of clanship are well described in a book written about the year 1730, entitled *Letters from an Officer of Engineers to his Friend in London*. 'The Highlanders,' it says, 'are divided into tribes or clans, under chiefs or chieftains, and each C. is again divided into branches from the main stock, who have chieftains over them. These are subdivided into smaller branches of fifty or sixty men, who deduce their origin from their particular chiefs, and rely upon them as their more immediate protectors and defenders. The ordinary Highlanders esteem it a most sublime degree of virtue to love their chief and pay him a blind obedience. . . . Next to this love of their chief is that of the particular branch whence they sprang, and in the third degree to those of the whole C. or name, whom they will assist, right or wrong, against those of any other tribe with whom they are at variance. . . . Lastly, they have an adherence to one another as Highlanders, in opposition to the people of the Low Country, whom they despise as inferior to them in courage, and believe that they have a right to plunder them whenever it is in their power. This last arises from a tradition that the Lowlands in old times were the possessions of their ancestors. The chief exercises an arbitrary authority over his vassals, determines all differences and disputes that happen among them, and levies taxes upon extraordinary occasions. . . . Some of the chiefs have not only personal dislikes and enmity to each other, but there are also hereditary feuds between C. and C., which have been handed down from one generation to another for several ages. These quarrels descend to the meanest vassals, and thus sometimes an innocent person suffers for crimes committed by his tribe at a vast distance of time before his being began.' This description conveys a clear idea of clanship as it existed in the Highlands early in the 18th c., when the system was in full force. It shows a curious mixture of patriarchal and of feudal government, and the customs and feelings of the people tended to keep it unimpaired amid the improvements and diffusion of knowledge which was taking place in other parts of the country. The distinction between the Highland and the feudal chief was, that the former was the hereditary lord of his C., wherever they dwelt or whatever land they occupied, while the latter was entitled to the military service of all who held lands under him. The one dignity was personal, the other territorial; the rights of the chief were inherent, those of the baron were accessory; the one might lose or forfeit his possessions, but could not thereby be divested of his hereditary character and privileges; the other, when divested of his fee, ceased to have any title or claim to the service of those who occupied the lands. It thus often happened in the Highlands that the head of the C. was one man, and the feudal owner of the land which it occupied was another. The following is General Wade's list of the Highland clans and their numbers that fought for King James in 1715:—Islands and clans of Lord Seaforth, 3000; M'Donalds of Slate, 1000; M'Donalds of Glengarry, 800; M'Donalds of Moidart, 800; M'Donalds of Keppoch, 220; Camerons of Lochiel, 800; M'Leods, in all, 1000; Duke of Gordon's men, 1000; Stewarts of Appin, 400; Robertsons of Strowan, 800; M'Intoshes and Farquharsons, 800; M'Ewen in Skye, 150; the Chisholms of Strathglass, 150; M'Phersons, 220; the Atholl men, 2000, and the Breadalbane men, joined without their superiors—total for King James, 14,140. The following, with a total of 8000, remained loyal:—Duke of Argyle, Lords Sutherland and Strathnaven, Lord Lovat's Frasers, the Grants, Rosses, and Munroes, Forbes of Culloden, Rose of Kilravock, and Campbell of Clunes. See *History of the Highlands and Highland Clans*, by James Browne, Esq., LL.D., Advocate (Glasg. 1840); *Concise Historical Proofs respecting the Gaels of Alban, or Highlanders of Scotland*, by James A. Robertson, F.S.A. (Edinb. 1866); *Sketches of the Manners and Present State of the Highlands of Scotland*, by Major General David Stewart (Edinb. 1825).

Clandes'tine Marriage. See BANNS, MARRIAGE.

Clandestine Mortgage. In England, if any one mortgage his estate a second time, without previously informing the postponed mortgagee in writing of the prior mortgage, or of any judgment or incumbrance he has voluntarily brought upon the estate, the postponed mortgagee is entitled to hold the estate as an absolute purchaser, free from the equity of redemption of the mortgager. In Scotland, C. M. is impossible. See RECORDS, PUBLIC; BOND, HERITABLE; MORTGAGE.

Clan Macduff, Law of. This was a barbarous privilege which formerly belonged to those related within the ninth degree to Macduff, Earl of Fife. If one having the privilege was found guilty of homicide, he was absolved by coming to Macduff's Cross, between Fife and Strathearn, and giving nine *kye* (cows) and a *colpindash*, a young cow.

Clap-Net, a ground-net used by birdcatchers in the S. of England, consisting of two equal sides or parts, each about 12 yards long by 2½ wide, and having a slight frame. The parts are placed parallel to each other, about 4 yards apart, and are closed upon one another by the pulling of a string, so as to cover the space between them. Call-birds are used as decoys for the wild birds the netters wish to catch.

Clapp'erton, Hugh, an African traveller, was born at Annan, in Dumfriesshire, in 1788, was sent to sea at the age of thirteen, and entering the navy, rose to the rank of lieutenant in 1814. He accompanied Lieutenant Denham and Dr Oudney (1822) on a Government expedition to Central Africa, with the view of ascertaining the length and course of the Niger. Oudney died at an early stage of this enterprise, which only resulted in determining the exact position of Bornu, Houssa, and Mandara. In 1825 C., along with Captain Pearce, Dr Morrison, and Mr Dickson, again set out for the same purpose. The party started from the Bight of Benin, but were almost immediately attacked

by severe illness, which C. alone survived. Pushing into the interior, he reached Sakkatu, where he was detained by the Sultan Bello. Here his health gave way, and he died at the village of Changary, 4 miles from Sakkatu, April 13, 1827. See *Narrative of Travels and Discoveries in N. and Central Africa in 1822–24, by Denham, C., and Oudney* (Lond. 1826), *Journal of a Second Expedition into the Interior of Africa, &c.* (Lond. 1829), and Lander's *Records of C.'s Last Expedition to Africa* (Lond. 1830).

Claque (Fr. 'a clap or slap with the hand'). A theatrical C., a distinct and acknowledged feature of the Paris theatres, is a body of individuals retained at a salary to applaud a special actor, and thus, so far, to secure the success of his engagement.

Cla'ra, Santa, or **St Claire,** was born at Assisi, in the Duchy of Spoleto, Italy, about 1193. At the age of eighteen she left the house of her father, a wealthy nobleman, and betook herself to the convent of Portioncula, under the auspices of St Francis of Assisi. She founded the order which bears her name in 1212, and was soon after joined by her sister Agnes, her mother, and several other ladies of high rank. After twenty-nine years of infirm health, occasioned by her excessive austerities, C. died, August 11, 1253, and was canonised, two years after her death, by Pope Alexander IV. See Prudent de Faucogney's *Vie de Sainte Claire* (Par. 1782). The *Order of St C.* is divided into 'Urbanists,' those that follow the mitigated rule drawn up by Pope Urban IV. in 1264, and 'Damianists,' a severer sect of the sisterhood. The convents of the order are numerous in Catholic Europe and in America.

Clare, a western maritime county of Ireland, in the province of Munster, N. of the estuary of the Shannon. Area, 1294 sq. miles; pop. (1871) 147,864. It is hilly in the E. and W., but an extensive and fertile plain occupies the centre, while on the mountain-sides and river-banks there are fine pastures or 'corcasses.' In 1871 there were 151,035 acres under tillage, 469,446 in pasture, 7349 in plantation, and 132,244 in waste bog, mountain, &c. Besides the Shannon, which bounds it on the S. and E., C. is watered by the Fergus, with its great estuary, the Ardsallas, Graney, Forsett, Dumbeg, &c., and has as many as 100 miniature lakes. The loftiest mountains are in the Slieve Baughta and Barnagh ranges, which reach a height of 1312 and 1758 feet respectively. C. has a wild and precipitous sea-line of over 100 miles. Where the Shannon merges in the Atlantic, the land runs out into the long, tapering promontory of Loop Head. C. is mostly formed of carboniferous limestone, and there are mines of coal, lead, manganese, copper pyrites, &c., and quarries of slate, flag, and black marble. The chief crops are oats, potatoes, wheat, and barley, and the manufactures include coarse linens, flannels, and friezes. There is a good coasting trade and active fisheries. Ennis is the capital, and communicates with Limerick by railway. A local line, 10 miles long, also connects Kilrush and Kilkee. C. has round towers, cromlechs, and other antiquities. It returns two members to Parliament.

Clare College, Cambridge, founded in 1326 by Elizabeth, sister and coheir of Gilbert, Earl of Clare. Its buildings, which are in the style of the Renaissance, are much admired. The chapel was built in 1535. The college contains eight senior and ten junior fellows, who elect the 'master.' The whole eighteen fellowships are open to Bachelors of Arts, or persons of a higher degree, without restriction as to marriage. C. C. has thirty-three scholarships, seven exhibitions, and the patronage of eighteen livings. In 1875 the number of undergraduates was eighty-five.

Clare Constat, Precept of, in Scotch law, is a deed executed by a subject-superior to complete the title of his vassal's heir to the lands held by the deceased vassal under the granter of the precept.

Clare Island, at the entrance to Clew Bay, forms part of County Mayo, Ireland. It is 4½ miles long and 2 broad, and supports a lofty lighthouse.

Clar'encieux, one of the three kings-of-arms of the Heralds' College of England—Garter, C., and Norroy. The two latter are provincial, and C. ranks first. His jurisdiction embraces all England S. of the Trent, and his duty is to survey all the coat-armour within his province, to register descents and marriages, and to marshal the funerals of all his subjects who are not under Garter (q. v.). C. also grants arms within his province, subject to the approval of the Earl Marshal (q. v.).

Clar'endon, Constitutions of, is the name given to the concordat between Church and state in England drawn up at a council of nobility and clergy held at the village of Clarendon, in Wiltshire, in 1164, in the reign of Henry II. These constitutions or laws were sixteen in number, and their main object was to restrict the power of the Church in England, and to give the crown the right to interfere in the election to all vacant offices in the Church. 'Many of the clauses,' says Mr Green (*Short History of the English People*, p. 103), 'were simply a re-enactment of the system established by the Conqueror.' This is no doubt true, but it is impossible to doubt that the sharp separation between the civil and ecclesiastical jurisdictions introduced into England by William was the real cause of the conflict between the two. Although the primate, Thomas Becket, signed them, they were rejected by the Pope of the period, Alexander III., and Becket himself vehemently retracted his consent. This led to his assassination, and subsequently to the penance of Henry II.; but in spite of the latter event, the C. of C. remained on the statute-book, and may be regarded as the germ of the ecclesiastical revolution accomplished in the reign of Henry VIII. In Professor Stubbs's *Select Charters illustrative of English Constitutional History*, the reader will find (pp. 137–140) the C. of C. 'in probably the exact form in which they were reported to the King, and confirmed by the bishops and barons.'

Clarendon, Edward Hyde, Earl of, an English politician and historian, was the son of a private gentleman, and was born at Dinton, in the county of Wilts, 18th February 1608. He studied first at Oxford and then at the Middle Temple. Entering Parliament in 1640 as member for Wotton Bassett, he took the side of those who insisted on a redress of grievances, but was at no time a Puritan—always strenuously upholding the cause both of the Church and the crown. When the civil war broke out, he left the House, joined the King at York, was made Chancellor of the Exchequer, and received the honour of knighthood. When fortune deserted the royal cause, he accompanied Prince Charles to Jersey, where he began to write his *History of the Rebellion.* Called to Paris in 1648, he was sent to Spain in the following year to solicit help from the Spanish court, but returned without success in 1651. He then went to Antwerp; was made 'High Chancellor of England' in 1657 by his exiled monarch, and was confirmed in the office at the Restoration. He was also created Baron Hyde, and subsequently Viscount Cornbury and Earl of C., and, in fact, was for a time, Premier. Court intrigues, however, and popular indignation at the failure of the war with Holland and the selling of Dunkirk to France, brought about his fall; he was deprived of his employments (1667), and retired to France. He died at Rouen, 9th December 1674. He was buried in Westminster Abbey. C. was a well-intentioned and virtuous man, and an honest and moderate politician, though lacking in firmness of purpose. His *History,* marred though it is by numerous inaccuracies and prejudices—one may even go further, and say, with deliberate perversions of fact—is still, from a literary point of view, an admirable work. Its 'portraits' are superbly executed, even when the likeness is not true. C. wrote several other works, of which the most interesting is an account of his own life. His state papers have been published in three folio volumes. C.'s daughter, Anne Hyde, married the Duke of York, afterwards James II., and was the mother of Queens Mary and Anne. His son, **Henry, Earl of C.** (1638–1709), was for a time Lord-Lieutenant of Ireland under James II., and wrote a *History of the Irish Rebellion.* His state letters and diary were published at Oxford in 2 vols., 1763.

Clarendon, George William Frederick Villiers, Earl of, an English statesman and diplomatist, was born 12th January 1800. He was descended from Thomas Villiers, who married the heiress of the last Earl of C. of the Hyde family, and was made Earl of C. himself in 1776. From early life C. was trained to be a diplomatist, being appointed ambassador at Madrid in the year 1833, in which office he helped to establish the Spanish Government on a constitutional basis. Succeeding to the earldom on the death of his uncle (1838),

he took his place in the House of Peers as a Whig, and supported Sir Robert Peel in his free-trade policy. After being Keeper of the Great Seal, he was, under Lord Russell's premiership in 1846, made first President of the Board of Trade, and subsequently Lord-Lieutenant of Ireland. The ability and firmness with which he put down the Irish rebellions of the time earned him the gratitude of his country. In the subsequent Liberal administrations of Lord Aberdeen, Lord Palmerston, and Mr Gladstone, C. held the office of Foreign Secretary, and few British statesmen have been more respected on the Continent. He died June 1870.

Clar'et. The red varieties of French wines imported into this country pass under the general name of C. They vary extremely in their qualities and value, the bulk being cheap light wines. Others, such as Chateau Lafitte, are of a very high class, and held in great repute.

Clarifica'tion, the process of removing suspended matters from liquids, accomplished either by filtration, by allowing the matter to deposit, or by adding albumen or a similar substance, whereby the suspended body is mechanically dragged down. It is a process of great importance in many departments of manufacturing chemistry.

Clar'inet, or **Clar'ionet**, a wooden reed instrument which occupies the place in military bands that the violin has in orchestras. The peculiar quality of its tone is caused both by its shape, and by the nature of the reed through which—held between the performer's lips—the air is blown into it. Its compass is about three octaves, but as it cannot be played conveniently in keys very distant from its natural key, each performer has always three instruments, of which the natural keys are A, B♭, and C, so that he may be able to play easily the varied keys of orchestral music. In military bands some higher clarionets are often used, and in orchestras occasionally a bass and contra-bass C.

Clar'ion, a form of trumpet of high pitch, not now used. It is also the name of a four-feet reed organ-stop.

Clark, Sir James, M.D., Bart., a British physician, was born at Cullen, Banffshire, December 14, 1788. Educated at the grammar-school of Fordyce and at King's College, Aberdeen, he studied medicine at Edinburgh and London, held for some years the position of navy surgeon, took the degree of M.D. at Edinburgh in 1817, and after travelling on the Continent, and practising as a physician for eight years in Rome, he settled in London in 1826. He soon acquired a high reputation, became physician to the Duchess of Kent, and, on the accession of Queen Victoria, her physician in ordinary. C. was made a baronet in 1838. He died June 29, 1870. Among his many contributions to medical science deserving of notice is his *Treatise on Pulmonary Consumption*, which he considered might be arrested by proper regulation of food, air, and exercise. He was a zealous advocate of the study, at an early age, of the laws of health.

Clarke, Adam, a Wesleyan divine, was born at Maggerafelt, in the N. of Ireland, in 1760. He became a 'circuit' preacher in Wiltshire in 1782, but settled in London in 1805; was appointed a sub-commissioner of the public records in 1807, and, after a laborious literary life, died at Bayswater, 26th August 1832. The chief fruits of his studies are his *Biographical Dictionary*, published in 1802, and his edition of the Bible in English (8 vols. 1810–26), illustrated with a commentary and critical notes. For his attainments in Oriental literature and biblical knowledge, the University of St Andrews conferred upon him the degree of LL.D.

Clarke, Edward Daniel, a traveller and savant, was born June 5, 1769, at Willingdon in Sussex. He studied at Jesus College, Cambridge, and acted as travelling tutor and companion to a number of noblemen and gentlemen, including Mr Hill (afterwards Lord Berwick) and Mr Cripps. His tour with the latter lasted from 1799 to 1802, and embraced the whole of Scandinavia, Russia, Circassia, Turkey, Asia Minor, Syria, Palestine, Egypt, and Greece. His travels were a source of great profit to his university and to his country. For the library of the former he secured a number of valuable marbles and MSS., and the colossal statue of the Eleusinian Ceres; and for the latter the celebrated sarcophagus of Alexander, now in the British Museum, and upon which he published a dissertation. Cambridge University conferred upon C., who had been instituted to the rectory of Harlton, the degree of LL.D., and a professorship of mineralogy was in 1808 created for him. His *Travels*, published during his life in 5 vols. (1810–19), and after his death in 11 (1819–24), were received with much favour, and his experiments with the oxyhydrogen blowpipe, have been productive of valuable scientific results. After his death, which took place March 9, 1822, his university purchased his Greek and Oriental MSS., including a Codex of Plato, discovered by him in the island of Patmos.

Clarke, Dr Samuel, a distinguished scholar, philosopher, and theologian, was the son of an alderman at Norwich, where he was born, October 11, 1675. Educated at Caius College, Cambridge, he there pursued with special zeal philosophical studies, and became an adherent of the system of Newton. C. filled various posts in the Church, and was ultimately made one of Queen Anne's chaplains and rector of St James's. Although his views on the Trinity (in his *Scripture Doctrine of the Trinity*, 1712) were considered semi-Arian, and censured by Convocation, he was a keen assailant of the free-thinkers of his time, and among the best-known of his works is his *Demonstration of the Being and Attributes of God* (Boyle Lecture, 1704). The basis of his ethical system is the famous 'eternal fitness of things,' or the relations of things established from eternity by God. Among the proofs of his scholarship are his editions of Cæsar (1712) and of Homer (1729–32), the latter of which was finished by his son. C. was offered the mastership of the Mint on the death of his friend Newton, but declined it. He died May 17, 1729. C. was a man of amiable disposition and irreproachable character. A collected edition of his philosophical works, among the most interesting of which are his letters to Leibnitz on Space and Time, was published in 4 vols. 1738–42.

Clarkson, Thomas, one of the most eminent of English philanthropists, was born at Wisbeach, Cambridgeshire, March 28, 1760, and studied at St John's College, Cambridge. He is said to have been led into the agitation against slavery in Africa by writing a prize-essay on the question 'Is it right to make slaves of others against their will?' After this he became the leader in, and devoted himself to, the agitation, secured the co-operation in Parliament of Wilberforce, wrote pamphlets innumerable on the subject, and, after the bill for suppressing the slave trade was passed in 1807, wrote a history of it (2 vols. 1808). C. lived to see the abolition of slavery in the W. Indies in 1833. He died at Playford, Suffolk, September 26, 1846, having spent the last years of his life in promoting various benevolent schemes. See Thomas Taylor's *Biographical Sketch of T. C.* in the *Gentleman's Magazine*.

Clar'y (*Salvia sclarea*), a plant, a native of Italy and the S. of Europe generally, but long cultivated in our gardens for the sake of its aromatic and medicinal properties. It is antispasmodic and stimulant, and is used for flavouring soups and confectionery with its characteristic odour of the balsam of Tolu. Its flowers are used in making a fermented wine. Wild C. is a name applied to *Salvia verbenacea*; Hormenium C. is *Salvia Hormenium*. The name of Wild C. is also applied to *Heliotropium Indicum*.

Class'ics. The name *classici* was applied to the highest of the six classes into which Servius Tullius divided the Roman citizens; and hence authors of pre-eminent worth have been termed *classic authors*; thus Aulus Gellius says—'Classicus scriptor non proletarius.' At the Renaissance, scholars, struck with the superiority of Greek and Latin to contemporary literature, distinguished the ancient from the modern writers by the word *C.*, but this restricted signification is no longer maintained. The Germans, and afterwards the French and English, extended the word to modern as well as ancient writers of eminence; and by the *C.* of a nation we now understand its leading authors, whose merits have been sufficiently proved by time and criticism to assure them of a permanent place in its literature. 'I call the classic,' says Goethe, 'the healthy. The *Nibelungen* is as classic as the *Iliad*, for both are healthy. The antique is classic, not because it is old, but because it is strong, fresh, joyous, and healthy.' The word is, however, still used in the narrower sense of the Greek and Latin authors; a *classical* education refers to the study of Greek and Latin writers alone, not to the study of

the more recent authors of other nations, whose beauties of thought and form have entitled them to the epithet *classic*, which was formerly monopolised by the ancients, as almost the sole examples of established fame and perfection of style in literature. 'Classic' and 'Romantic' are occasionally used to distinguish Southern Romantic from Northern Teutonic art; and again they are frequently opposed in regard to French writers—'Classic' being applied to the school of Racine, and 'Romantic' to that of Hugo. But these partisan uses of the word are only the perversions of prejudice.

Classifica'tion of Animals. Two principles may be employed in classifying animals. One of these, forming the *artificial* method, has for its essential feature that of founding its characters upon resemblances between animals of a more or less external and superficial kind. Thus the savage employs an artificial method of classification when he classifies together fishes and whales from their outward appearance, or birds and bats because both fly. Such a procedure resembles the practice of arranging the books in a library solely by their outside resemblances or styles of binding—a method this, which could give no one any reasonable idea of the true nature of the volumes, any more than the classification of the savage expresses any definite relation between the animals he thus classifies. In opposition to this artificial method, which characterised the earlier history of zoology, we have the *natural* method. By means of this latter we group together only animals that are like in the *details of their structure*, and this method, therefore, is the expression of a true structural relationship between the organisms which it brings together. It is, in other words, a convenient expression of the facts and laws of morphology and physiology. The whale would, therefore, in this classification, be placed among the mammals, from a consideration of its structure, and not with the fishes, which it somewhat resembles in outward appearance. The animal kingdom is divided through the consideration of the morphological *type*, or broad features of structure, into five or six sub-kingdoms, which, beginning with the highest, are named respectively *Vertebrata* (q. v.), *Mollusca* (q. v.), *Annulosa* (q. v.), *Annuloida* (q. v.) or *Echinosoa* (q. v.), *Cœlenterata* (q. v.), and *Protozoa* (q. v.). Each sub-kingdom admits of division into *classes*, the classes are divided into *orders*, the latter into *families* and *genera*, and the genera into *species*. See also SPECIES, &c.

Claude, St, a town in the department of Jura, France, 25 miles S. of Lons-le-Saulnier, at the confluence of the Bienne and Tacon. It owes its origin to a Benedictine abbey, founded here in the 5th c. St C. has tanneries, potteries, and paper-works, and manufactures of turnery-ware on a large scale, consisting of articles in ivory, bone, horn, shell, boxwood, &c. Pop. (1872) 6085.

Claude Gelée, usually called **Claude Lorraine**, was born of humble parentage at Champagne, in Lorraine, in 1600, went in youth to Rome, in company with some adventurers of his district, and entered into the service of Tassi, a painter, for whom he acted as cook, groom, and colourman, and by whom he was taught the principles of art. He was an earnest and conscientious student of nature, and delighted in observing the varying phases of light and colour under which the same view presents itself at different seasons. This constant habit, together with his unwearying practice at the easel, raised him to the highest rank as a landscape painter. He settled finally at Rome in 1627, painted assiduously, and, after enjoying the patronage of Popes Urban VIII., Clement IX., and Alexander VII., died at Rome, 1678. C.'s works are to be found in every great gallery in Europe. England is particularly rich in specimens—Dr Waagen counting fifty-four in all. The picture which C. himself considered his best is the 'Villa Madama.' Four exquisite pieces, 'Morning,' 'Noon,' 'Evening,' and 'Twilight,' are in the St Petersburg Gallery. C.'s landscapes combine beauty of scene with truth in the highest degree. No painter has rendered the foliage of trees, and the character of their different species, with greater fidelity combined with high picturesque effect. It was the wish of Turner to be considered his rival, and the greatest of English landscape-painters presented one of his finest works to the English nation on the condition that it should hang in the National Gallery side by side with one of the acknowledged masterpieces of the greatest landscape-painter born in France.

Claudia'nus, Cla'udius, born at Alexandria, flourished at the close of the 4th c. and the commencement of the 5th. He wrote at first in Greek, but the success of his panegyric on the consulate of Probinus and Olybrius in Latin verse induced him to abandon the language in which he had been educated. C.'s extant works consists chiefly of idylls and epigrams, and of panegyrics on the Emperor Honorius and his powerful minister Stilicho, the patron of C., and 'the perpetual theme' of his verse and of invectives against their enemies. The most important of his works is the very fragmentary epic poem the *Rape of Proserpine*. C.'s poetry is characterised by an 'absolute command of the Latin language,' splendid powers of description, and a brilliant, if somewhat ill-regulated, fancy. There are editions of C. by Heinsius (Leyd. 1650, 1665), Burmann (Amst. 1760), Gessner (Leips. 1759), and Doullay (Par. 1836).

Clau'dius I., more fully **Tibe'rius Clau'dius Dru'sus Nero**, Roman Emperor, was born, August 1, B.C. 10, at Lyons, in Gaul. He was the son of Drusus, step-son of Augustus, and succeeded to the purple on the murder of his uncle Caligula, in A.D. 41. C. in early life suffered much ill-treatment and neglect, being considered by his family little better than an imbecile. His natural stupidity, however, was strangely combined with an eager desire for knowledge, which led him to study with secret industry both science and literature; but his cowardice and weakness of character unfitted him for a public career. He was fifty years of age when proclaimed Emperor by the Prætorian Guards, who found him hiding in terror in a corner of the palace. Though he set an evil precedent by granting a donation to the Prætorians, C. began his reign with a just and moderate policy, but speedily fell under the dominion of others, who abused the imperial power. He was uxorious and fond of favourites; so that his wife Messalina, and his freedmen Narcissus and Pallas, found it easy to govern or plunder and torture in his name. The union of C. with his niece Agrippina, after the execution of his former consort (48 A.D.), was not more fortunate; for, having persuaded him to adopt her son Nero, she afterwards poisoned him (54 A.D.) in order to secure the succession. C. was endowed with abilities which might have gained him eminence in an obscurer sphere; he composed several historical works, among them a *History of Etruria*. The wars of his reign were, on the whole, victorious. C. himself undertook an expedition to Britain, and Mauritania was made a Roman province. Several public works, on a large scale and of great utility, were executed by C. Among these were the *Aqua Claudia*, the vast aqueduct which supplied Rome with water all through the middle ages; the port of Ostia, and the canal between Lake Fucinus and the river Liris.

Clause of a Deed is, in law, one of its subdivisions.

Clause of Pre-emption, in Scotch law, is a clause sometimes inserted in a feu-right, stipulating that the vassal shall not sell the lands without first offering them to the superior, or that the superior shall have the lands at a certain price fixed in the clause.

Clause of Devolution, in a Scotch deed, is a clause devolving some office or duty on some one on a stated event.

Clause of Return, in a Scotch deed, is a clause by which the granter of a right makes a particular destination of it, and provides that in a certain event it shall return to himself.

Clauses, Irritant and Resolutive, in a Scotch deed. These are two clauses which limit the right of an otherwise absolute proprietor, and which make the conditions imposed—without these clauses only a personal obligation—effective against creditors and singular successors. See SINGULAR SUCCESSOR.

Claus'el, Ber'trand, a French marshal, was the son of Jean-Baptiste C., a French Revolutionist of some mark, and was born at Mirepoix, in the department of the Ariège, 12th December 1772. Entering the army at an early age, he distinguished himself in Holland, Italy, Austria, and Spain. After the defeat of Marmont at Salamanca, July 22, 1812, he obtained the command of the French army, and conducted its retreat into Portugal with much ability. On the restoration of the Bourbons C. was declared a traitor, and even condemned to death, but he was ultimately allowed to return from America, whither he had escaped. In 1830 he was appointed to the command of an expedition to Algiers, and being successful, was made a marshal of France. In 1835 he was appointed governor-general of Algeria, but being blamed for the disasters that befell the

French army under the walls of Constantine in the following year, he returned to France. C. died at Secourrieu (Haute Garonne), 21st April 1842.

Claus'enburg. See KLAUSENBURG.

Claus'thal. See KLAUSTHAL.

Clavagell'a, or **Clubshell**, a genus of Lamellibranchiate mollusca, belonging to the family *Gastrochænidæ*. The shell in C. is club-shaped and oblong, and one of the valves or halves of the shell is free, whilst the other is attached to an elongated tube, frequently divided by a longitudinal partition. This tube terminates like that of Aspergillum (q. v.), or the 'Watering-pot Shell,' which belongs to the same family as C. *C. aperta* and *C. lata* are familiar species. *C. cretacea* occurs as a fossil in the Chalk rocks, and the genus commences in a fossil state in the Upper Greensand. Several living species exist as above named.

Clav'ichord, or **Clav'ecin**, one of the older forms of the piano, used frequently until about a century ago. Its strings were struck by pins attached to the ends of the keys, and were damped by pieces of cloth so as to produce a very soft sound.

Clav'icle. This is a bone familiarly known as the collar-bone. It passes from the summit of the breastbone, or sternum, to the acromion process of the scapula, and it connects the superior extremity with the trunk. It has a curved form, somewhat like the italic *f*. To it are attached various muscles of the neck, trunk, and arms, and it acts as a fulcrum for the action of these muscles. It is absent in all pachydermata, ruminants, and solidungula, because in these animals there is no lateral movement of the fore extremity. In birds the two clavicles are very large, and unite to form a single bone known as the furculum, or 'merry-thought.' This arrangement in birds is probably for preventing the powerful pectoral muscles from approximating the shoulders. The C. is the first bone in the body to ossify. The first ossific nucleus makes its appearance about the sixth week. Two other nuclei make their appearance; that of the sternal end joins the body of the bone from the 18th to the 25th year. See SKELETON.

Dislocations of Clavicle.—Either end of the C. may be dislocated. Surgeons describe three dislocations of the *sternal* end of this bone—*forwards*, *upwards*, and *backwards*—according to the position of the displaced end. Of these three, the dislocation *forwards*, though a rare injury, is the most common. It is the result of violence, generally caused by a fall or blows on the shoulder. This dislocation is easily recognised by feeling the displaced end of the bone projecting in front of the upper part of the Sternum (q. v.). There is also depression of the shoulder. Reduction is effected by moving the shoulder upwards and backwards, and using pressure on the displaced end of the C. As some difficulty is generally experienced in retaining the bone in position, the advice of a surgeon should always be sought.

The dislocation *upwards* is very rare. It is easily recognised by the end of the bone being felt to be elevated into the neck, with depression of the shoulder. Reduction is effected in much the same way as in the previous case, and the limb is retained in position by a pad and bandage.

The dislocation *backwards* is very rare, and is generally caused by direct violence to the parts. It has also been caused by curvature of the spine. When due to this latter cause, little relief can be obtained. In this dislocation the shoulder is elevated, and there is generally more or less interference with the circulation and respiration, on account of the displaced end of the bone pressing on the nerves and blood-vessels of the neck. After reduction it is necessary to keep the shoulder removed from the side, which is best accomplished by placing a pad in the armpit, and binding the elbow towards the side.

When the *acromial* end of the C. is displaced (which is not uncommon), it is generally, if not always, *upwards*, and is the result of a fall on the shoulder. This dislocation is easily recognised by the end of the C. being felt to be projecting upwards whilst the shoulder is depressed. The bone is easily replaced, but some little care is necessary afterwards to retain it in position.

Fracture of Clavicle.—Fracture of the C. is much more frequent than dislocation. It is generally due to violence; the fracture is oblique, and occurs most frequently near the middle of the bone. The shoulder is depressed and drawn forwards. By moving the arm, pain is elicited, and *crepitus* felt at the seat of injury. The outer portion of the C. is dragged downwards by the weight of the arm—causing the inner or sternal end to appear very prominent. This fact has frequently caused the ignorant to mistake which end of the broken C. was displaced. The treatment consists in raising the shoulder, and keeping it removed outwards by a pad in the armpit or other appliance, and retaining it in that position by means of bandages.

Clavicor'nes, the name given to a tribe of *Coleoptera* or Beetles, distinguished by the clubbed tips of their antennæ or feelers, which exceed the palpi of the maxillæ (or lesser pair of jaws) in length. Of this group the Burying Beetles (q. v.) form typical examples, and the genus *Dermestes*, or Bacon Beetles, also present a familiar group.

Clavig'ero, Francesco Saverio, a historian of Mexico, was born about 1720, and sent by the Jesuits as a missionary to the Mexican Indians, among whom he laboured for thirty-six years. While thus engaged, he collected materials for the history of the country, both before and after its conquest by the Spaniards. On the suppression of his order in 1767, he withdrew to Cesena, in Italy, where, in 1780–81, he published the fruit of his researches, under the title of *Storia antica del Messico, cavata da' migliori storici Spagnuoli, e da' manuscritti e pitture antiche degli Indiani*, translated into English by C. Cullen (2 vols. Lond. 1687). C. died at Cesana, October 1793.

Clavija, a genus of *Myrsinaceous* plants, of tropical S. America, named in honour of J. Clavijo Faxardo, a Spanish botanist. The fruits of some of them are eatable, and the roots of others are emetic.

Clay (Old Eng. *clæg*, the 'g' is still retained in the Lowland Sc. 'clag' and 'claggy'), a natural earthy compound, in a state of minute division, which with water acquires plasticity, and may be kneaded or moulded into a particular form, and hardened by heat. Typical or pure C. is composed of silica, alumina, and water, forming, in chemical language, a hydrous-silicate of alumina; but as natural clays are the result of the disintegration of primary rocks, they are never absolutely free from the admixture of other substances, such as lime, sand, magnesia, mica, and oxide of iron. The impurities give different colours to the numerous varieties of C., and so it occurs of all shades, from white, when nearly pure, to grey, red, blue, brown, and even deep black, from the presence of carbon. The purest clays are the most plastic, and as they burn white in the kiln, they are highly valued for the manufacture of fine earthenware, and are known by the names of Kaolin or China-C., Potter's-C., and Pipe-C. (q. v.). Fire-Clays (q. v.), of which *Stourbridge C.* is the most famous, contain much silica, and are very infusible. Common C. or loam is abundantly distributed over the earth's surface, and is largely employed in the manufacture of bricks, tiles, and coarse earthenware, which assume a red colour on firing, because of the oxide of iron present in the C. Brick-C. should contain much sand and little potash, soda, lime, or iron; indeed, any C. that is to be exposed to a high temperature should be almost free from the alkaline earths, as they give fusibility. C. constitutes an important part of all fertile soils, and possesses the highest agricultural value on account of its absorbent action on moisture, ammonia, and other fertilising agents. A C. soil is difficult to work; still the excellence and luxuriance of the crops which it produces amply repays the extra labour entailed.

Clay, Cassius Marcellus, a Southern abolitionist, was born in Kentucky, 19th October 1810, and graduated at Yale College in 1832. He early entered the field of politics, and gained much *éclat* by taking what in his state was the unpopular side of 'abolitionism,' and displaying in his speeches considerable audacity. He supported Mr Lincoln, and was sent as U.S. minister to Russia in 1862, where he remained. Since his return, he has not taken a prominent part in politics. A volume of his *Speeches* was published in 1848. C. has more than once permitted himself to use language regarding England which all respectable Americans would probably reprobate.

Clay, Henry, an eloquent American orator and statesman, was born in Hanover county, Virginia, April 12, 1777. He studied law, was licensed in 1797, and commenced in Lexington, Kentucky, where he soon gained a lucrative practice. In 1806 he was elected to Congress, and in 1811 was chosen Speaker of the House of Representatives. C. strongly repudiated the British claim to 'right of search' at sea, advocated the war of 1812,

and was sent to Ghent in 1814 as U.S. commissioner to sign the treaty of peace. On his return he espoused the cause of South American independence, and also introduced what he called 'the American system,' which was a heavy protective tariff to promote home manufactures. C. laboured for the compromises with slavery in 1820 and 1850, and was three times a candidate for the presidency, but was defeated each time; yet he was undoubtedly one of the most popular leaders that America has ever had. He died at Washington, June 29, 1852. See Colton's *H. C., Life, Letters, and Speeches* (1857).

Claymore' (Gael. *claidheamh-mor;* lit. 'big sword'), a formidable weapon used by the Scottish Highlander. It was double-edged and two-handed; the length of its blade was sometimes nearly 4 feet.

Clazom'enæ, one of the cities of Ionia, on the S. side of the Hermæan Gulf (mod. Bay of Smyrna), at first built on the mainland, from which the people, through fear of the Persians, passed over to an adjacent island, which Alexander made a peninsula by uniting it to the mainland. Its site is now occupied by Vurla.

Clean'thes, a Greek philosopher, born at Assos, in the Troad, about 300 B.C., came to Athens in his manhood, and received instruction from Zeno for fifteen years. Poverty obliged him to draw water for a gardener during the night, and to write his lecture-notes on bits of potsherd and ox-bones. He nevertheless refused the proffered gift of the Areopagus (10 *minæ*). Slow in apprehension, he was at first called the Ass, but latterly the second Hercules. In 263 C. succeeded Zeno in the Stoa. There he taught the immortality of the soul, varying in intensity with the soul's life here. He repeated that man's duty was to live harmoniously with universal nature, *i.e.*, with the Divine Reason, which impresses laws upon passive matter. In metaphysics he maintained that in sense-perception the soul was affected as wax by a seal, but that the soul could distinguish the cataleptic phantasm, or true perception, from the acataleptic, or perception produced by dreams or insanity. His morality resulted in the starvation of all bodily desires, and his death proves his consistent faith, for it was either occasioned or accelerated by voluntary abstinence from food. Only a few fragments of C.'s works (of which Diogenes Laertius gives a list) have reached us—the finest being a *Hymn to Zeus* preserved in Stobæus.

Clear'ance, a term of the mercantile marine, denoting the custom-house or emigration-office licence for a ship to leave the port. All dues must be paid and all proper formalities observed before the C. can be got. A foreign vessel must be certified by the consul of the nation to which she belongs. See BILL OF LADING, CHARTER-PARTY.

Clear, Cape, on an island of the same name, forming part of County Cork, is the extremest S.W. point of Ireland. It is a lofty headland, 400 feet high, with a lighthouse and revolving light 455 feet above the sea.

Clear Days, an English law-term. In a lawsuit there are several steps in the proceedings which must be taken within a specified number of C. D. In reckoning these, the day on which the process is served and the day of hearing are not counted.

Clear'ing-House, in banking. Formerly the London bankers used to exchange cheques and settle amounts by a daily meeting of their clerks at one of the banks. But in 1775 a building, now called the C.-H., in Lombard Street, was acquired for the purpose. The arrangements are directed by a committee appointed by the banks. There are two paid managers or inspectors. During the day each house transmits the cheques and bills which it receives on the others, and keeps a note of the obligations coming against itself. Accounts are closed at four o'clock. Three-quarters of an hour is allowed for the banks to consider drafts upon it, and to decide whether they are to be honoured. Meanwhile the bills and cheques have been classified at the C.-H., and by half-past five accounts are adjusted, each bank paying or receiving the balance due by or to it. The payment is made by what is called a *Transfer Ticket*. This is a draft on the Bank of England signed by the bank whose account is settled by it and by an inspector of the C.-H. When the balance is against the bank the ticket is white, when against the C.-H. a green one is used. Thus transactions involving millions of pounds are settled without the intervention of a sovereign or a bank-note.

Clearing-House, The Railway.—This is an ingeniously devised institution for regulating the complicated accounting between the railways of Great Britain. Plainly the equitable adjustment of the expense and receipts of the *through* traffic must be a work of much labour and difficulty; nevertheless, by means of the staff of the C.-H., these tangled accounts are, month by month, unravelled and a balance struck. The office of the institution is in London, near the Euston Station. It is regulated by the 'Railway Clearing Act, 1850.' There is a similar institution in Ireland, having its office in Dublin. The expenses are defrayed rateably by the companies forming the association; of these, there were ninety-three in 1873. Officials of the C.-H. attend at each railway junction. They note the number of each carriage, van, waggon, or other vehicle which quits the original line. They also take a note of damaged stock. They make weekly returns to headquarters; these, with the collected passenger tickets, supply dates, which form the basis of the accounting. A balance due by one railway to another on passenger or stock traffic, must be paid within five days after the date of the C.-H. advice. Balances arising otherwise are payable within twenty-three days. Interest on over-due balances is charged at the rate of 7 per cent. per annum. Cases of disputed liability are considered and decided by committees of duly qualified men.

Clearing-Nut, an Indian name for the nut of *Strychnos potatorum*, a plant belonging to the same genus as that which yields *Nux Vomica* (q. v.). It is commonly sold in the Indian bazaars for the purpose of clearing water. If the seeds are rubbed on the inside of a vessel, muddy water put into it soon becomes clear by the deposition of impurities. Their efficacy is due 'to the presence of albumen and casein, which act as fining agents, in a similar manner to analogous agents employed for beer and wine.' The seeds are also emetic, but devoid of poisonous qualities, while the pulp of the fruit is eatable. It may be also noted that this is also true of *S. Pseudo-Quina*, and that birds eat greedily of that of *S. Nux Vomica*, which yields strychnine (Roxburgh).

Clear-Story, or **Clere-Story**, is the name given to the upper story or wall of a church immediately above the roof of the side aisle, pierced with windows, through which light is admitted to the centre aisle. It is so called in opposition to the blind story or Triforium, which, opening from the centre aisle into the space covered in by the roof of the side aisle, is consequently blind or dark. C.-S. windows are to be found in the Basilicas, and in all the various periods of Gothic architecture; and till about the middle of the 14th c. they were generally small in size and wide apart. About this time they began to be greatly enlarged, in many instances the masonry being reduced to a minimum consistent with strength. A narrow passage is often found in the thickness of the wall at the C.-S., level, and leading all round the church, thus giving access to close the shutters or louvers when required, as well as for repairs.

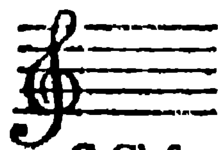
Cleats, on ship-board, are projecting pieces of wood or iron, formed so that ropes may be secured to them.

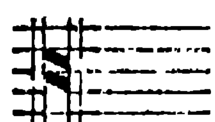
Cleav'age, the name given in geological science to that condition or state of rock-particles, in virtue of which a rock can be readily split up into thin *laminæ* or plates, independently of any original lamination (or division into layers) which may have existed in the rocks. C.—'transverse' or 'slaty C.,' as it is termed—is best seen in *clay-slates*, but also occurs in sandstones and limestones, and in some trap rocks. It is best seen in purely-grained rocks, and splits such into very thin plates, lying smooth and parallel to each other. Of the origin of C., theories of *compression* are those most in vogue to explain the phenomena. Tyndall has shown that, if clay or white wax be subjected to pressure, allowing of expansion in directions at right angles to the pressure, slaty C. may be thus produced in these substances. This 'C.' of slate gives to that deposit valuable features in rendering it useful, in the form of thin plates, for many industrial purposes. C. tends to alter or destroy the presence of fossils in rocks, and its action is therefore to be taken into important account by the palæontologist.

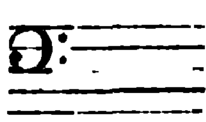
Cleav'ers, or **Cliv'ers** (*Galium Aparine*), a species of Bed-straw (q. v.) very common in hedgerows and similar situations in

Britain, &c., so called from clinging to clothing coming in contact with the leaves, which are covered with reflexed stiff-pointed hairs or bristles. At one time it was believed to be a specific in many cutaneous diseases, but its efficacy in these affections has not yet been fully determined.

Clef, in music, a sign placed upon the staff to indicate the absolute pitch of all the notes upon one particular line or space, and thus to fix indirectly the absolute pitch of all the other notes upon the same staff. Clefs are used, the forms of which are shown below, to indicate the positions of G, C, and F respectively in the staff.


G Clef.


C Clef.


F Clef.

The G (or soprano) C. is in modern music invariably placed, as in the figure, upon the second line; the C C. is generally, but not always, upon the middle line, and the F (or bass) C., always upon the fourth line.

Cleg, a popular name applied to some Diptera or Flies belonging to the family *Tabanidæ*, or to that of the Breeze and Gad-flies. The *Chrysops cæcutiens* is the English 'C.,' which averages one-third of an inch in length, and is coloured black with yellow abdominal markings. The eyes are large. The 'C.' of Scotland, a smaller species, is the *Hæmatopota pluvialis*, or English 'Stout.' These flies possess a mouth adapted for piercing the skin of animals, and annoy horses, cattle, and domestic animals in summer especially, whilst they also attack man.

Clem'atis, a large genus of twining shrubs belonging to the natural order *Ranunculaceæ*, and easily distinguished by the long feathery style attached to their one-seeded carpels. There is only one English species, *C. vitalba*, the Virgin's Bower, the Traveller's Joy, or the Old Man's Beard. *C. flammula* is a sweet-scented species, a native of Southern Europe and Northern Africa, now common in our gardens. *C. florida* is accounted one of the most beautiful of all the species, and is that which remains longest in bloom; but *C. azurea*, *C. lanuginosa* (a fine blue-flowered Japanese species), and *C. tubulosa*, in addition to numerous hybrids, such as *C. Jackmanni*, must also be classed among the favourite cultivated species of C.

Clem'ens, Samuel Langhorne, better known by his *nom-de-plume* of 'Mark Twain,' an American humourist, was born in Florida, Missouri, U.S., November 30, 1835. He worked first as a printer, but afterwards, in Nevada, as a journalist, when he developed a fresh phase of American humour, extravagant, surprising, and grotesque. In 1867 C. published *The Jumping Frog*, and in 1869, as the results of his travels in Egypt and the Holy Land, *The Innocents Abroad*, an amusing travesty of lofty and serious things—*e.g.*, in his weeping over the tomb of Adam, his blood-relation, in the Church of the Holy Sepulchre. His other works are his *Autobiography* (1871), *Roughing It* (1872), *The Gilded Age* (1873), by C. and Warner. A collection of his choice humorous works was published in London (1875).

Clemens, Titus Flavius, surnamed *Alexandrinus*, in distinction from *C. Romanus*, a philosopher and theologian of the 2d and 3d centuries, was born either at Alexandria or Athens. Versed in all the science of the Greeks, at the age of manhood he convinced himself, by free inquiry, of the truth of Christianity. He now travelled over Greece, Italy, Egypt, Palestine, and the East in search of instruction from the great exponents of the new religion; but the only one whom he expressly names is Pantænus, the catechist or head of the Christian school at Alexandria. C. finally settled there, succeeded Pantænus as catechist and bishop (?180), and died between 212 and 220. His peculiarity was that he did not cast aside his philosophy when he became a Christian, but held the eclectic system afterwards called Neo-Platonism, and always sought to illustrate his teaching by the light which could be thrown on the doctrines of the Church from heathen antiquities. C.'s three great works are *The Exhortation to the Heathen*, *The Instructor* or *Pædagogus*, and the *Stromata* or *Miscellanies*. The object of the first is to win over heathens to Christianity; of the second, to build up converts in righteousness; of the third, to furnish the materials for a true gnosis on the basis of Christian faith. See Clarke's *Ante-Nicene Library* (1867).

Clemens, surnamed *Romanus*, and, according to the ancient Church, the fellow-labourer of Paul (mentioned Phil. iv. 3), was one of the earliest Bishops of Rome, and is one of the 'Apostolic Fathers' (q. v.). His (First) Epistle to the Corinthians is of dogmatic importance in relation to the doctrine of the Resurrection. The other writings attributed to him, a Second Epistle to the Corinthians, Two Letters on Virginity, the Apostolic Constitutions, the Apostolic Canons, and the Clementines, are unquestionably spurious. The two Epistles of C. to the Corinthians were found at the end of the *Codex Alexandrinus* (see ALEXANDRIAN CODEX). Both were defective; a leaf had been torn out of the first, and the end of the second was wanting. No other MS. of these was known to exist until Philotheos Bryennios, Metropolitan of Serræ in Macedonia, discovered one in the library of the Holy Sepulchre at Constantinople, and published an edition of them in 1875. His MS. contains both of the Epistles in a complete form.

Clem'ent is the name of seventeen Popes, of whom the most notable are—**Clement VII.** (Giulio de Medici), who, as cardinal under Popes Leo X. and Adrian VI., had devoted himself to the Spanish cause in Naples and Milan. On his election as Pope in 1523, however, C. attempted to organise a national Italian party against Karl V., whose increasing power he dreaded. This led to the capture of Rome in 1527 by 'Bourbon's black banditti.' The growth of the Reformation after the Diet of Spires and the peace of Kadan was equally alarming to C., who sought the help of François I. and Henry VIII. He died in 1534, having by a secular policy reduced the influence of the Church to the lowest point. He founded the 'Monte della Fede,' or system of public credit, in which the creditors were associated in the management (*dogana*).—**Clement VIII.** (Cardinal Ippolito Aldobrandini) was elected 20th January 1592. Although belonging to the Ecclesiastico-Spanish party, he is chiefly remembered in connection with the return of Henri IV. to the Church (which enabled C. to wrest Ferrara from Cesare d'Este), the readmission of the Jesuits to France, and the peace of Vervins. He died in 1605.—**Clement XI.** (Cardinal Giovan Francesco Albani), was elected 16th November 1700. At first a warm supporter of the French claim to the Spanish succession, he was compelled after the victories of Marlborough to acknowledge Charles III. as the Catholic King. By the peace of Utrecht, Sicily and Sardinia, which C. regarded as his own fief, were bestowed on the House of Savoy, with whom he soon had a bitter dispute as to *Di Monarchi* (a Sicilian tribunal which encroached on Papal privileges). In 1713 C. published the Bull 'Unigenitus,' condemning the 101 propositions in Father Quesnel's book; this irritated the French Jansenists and Nationalist clergy against Rome. C. was also connected with the great Jesuit missionary movement in China, the Stuart rebellion of 1715, and the expedition of Prince Eugene against the Turks in 1716. He died in March 1721.—**Clement XII.** (1758–69). His rule is marked by the suppression of the Jesuits by Choiseul in France, Wall and Squillace in Spain, Fanuci in Naples, and Carvalho in Portugal. C. refused to abolish the order, and thus lost nearly all influence in Europe.—**Clement XIV.** (Cardinal Giovanni Vincenzo Antonio Ganganelli), was elected through Bourbon influence, 19th May 1769. He was of a mild, religious disposition, and anxious to establish peace in the Church. The Curia was then divided into the *Zelanti*, or upholders of the ancient privileges of the Church, and the *Regalisti*, or party of concession to the crowned heads. C. belonged to the latter. He discontinued the reading of the Bull *In Cœna Domini*, allowed the claims of Sardinia and Parma, and on 21st July 1773 abolished 'the Society of Jesus, its offices, houses, and institutions.' This act greatly assisted the Cismontane movement in Austria under Maria Theresa and Joseph II. C. died 22d September 1774.

Clemen'ti, Mu'zio, one of the earliest composers and performers of the modern pianoforte school, was born at Rome in 1752. He came to England as a boy, and for some time devoted himself to composing and teaching, but later on took up a music-publishing and pianoforte-making business, which he carried on successfully until his death, 10th March 1832. Most of his compositions (over 600 in number) are for the pianoforte.

Two of his works are considered authorities, *Practical Harmony* (4 vols. 1811–15), and the *Gradus ad Parnassum* (3 vols.).

Cleome, a genus of plants of the order *Capparidaceæ*, found in the tropical regions of America. Most of the species are annuals —one, *C. pungens*, attaining the height of 4 or 5 feet. Among other species may be mentioned *C. spinosa* and *C. speciosissima*, one of the handsomest of the genus, several of which are cultivated for the sake of their beautiful flowers.

Cleome'des, an ancient Greek astronomer, of whose life absolutely nothing is known. His treatise, *The Circular Theory of the Heavenly Bodies*, is a work in which truth is strangely mixed up with error. He held that the earth was spherical, and was a mere point in relation to the stellar sphere; that the moon rotated on its axis; that the fixed stars were as large, if not larger than the sun, and he also discussed the refraction of light. The two latest editions of this work are by Bake (Leyd. 1820) and Schmidt (Leips. 1832).

Cle'on, a famous popular leader of the Athenians, the son of Cleænetus, was brought up as a tanner. Even before the death of Pericles, however, he had achieved success in the more profitable trade of demagogue. In 427 B.C. he urged the Athenians to put to death all the adult males in Mitylene (about 6000), and to sell the women and children into slavery, and he so far attained his object. In 425 he succeeded, along with Demosthenes, in taking captive the Spartans who garrisoned the island of Sphacteria. In 422 he took the field against Brasidas, the famous Spartan general, in Chalcidice. He captured Torone, but in an attack on Amphipolis, the Athenians were defeated, and C. fled and fell. Thucydides and Aristophanes represent C. as the impersonation of violence, dishonesty, rapacity, and venality. Apart from the inconsistencies involved in this representation of his character, Grote forcibly urges in proof of its extravagance, that C. had proposed the banishment of Thucydides, and that Aristophanes himself admits that he had a grudge against him.

Cleopat'ra, the beautiful and accomplished, but ambitious and voluptuous Queen of Egypt, the last of the dynasty of the Ptolemies, was born B.C. 69. By the will of her father, Ptolemy Auletes, C. succeeded to the kingdom, along with her brother Ptolemy, but was expelled by him, B.C. 49. She was, however, reinstated by Cæsar, who was conquered by her charms, and to whom she bore a son, named Cæsarion, afterwards put to death by Augustus. In the war that ensued, young Ptolemy was killed, but a younger brother of the same name, whom she eventually poisoned, was associated with her in the government. On Cæsar's return to Rome, C. followed him, and there lived in his house, and received from him many gifts. On his death, B.C. 44, she fled to Egypt, and materially aided the triumvirate against the murderers of Cæsar. After the battle of Philippi, Antony summoned her to attend him at Tarsus, and her beauty so completely bewitched the impetuous and passionate Roman, that he remained her slave through life, and returned to her even after his marriage with Octavia, sister of Augustus. The infatuation of Antony in paying extravagant honours to C., and in assigning extensive territories to her and her children, so incensed and disgusted the Romans, that they declared war against her, and the great victory of Actium, B.C. 31, decided the fate of Antony and C. Augustus pursued them to Alexandria, where Antony, misled by a false rumour of C.'s death, fell on his sword. C., after vainly endeavouring to captivate Augustus, put an end to her life by the poison of an asp, B.C. 30.

Clepsyd'ra (Gr. *klepto*, 'I conceal,' and *hydor*, 'water'), a kind of organ, used by the ancient Greeks, and described by Athenæus. The air was forced through the pipes by the action of water, giving rise to a soft musical sound.

Clepsydra, also an instrument used, before the discovery of the pendulum, for measuring intervals of time by means of the flow of water through a small orifice. The rate of flow varied with the temperature, barometric pressure, and generally with the height of the column of water above the orifice. This last source of variation is of the greatest importance, and is sometimes got rid of by keeping the vessel always full. In order that the rate may be the same at whatever height the surface of the fluid is, the vessel must be the surface of revolution of a cubical parabola.

Clerc, Jean le, a French theologian, was born at Geneva, 19th March 1657. Having adopted the tenets of the Arminians, he settled in Holland in 1683, joined the Remonstrants in Amsterdam, and being interdicted by the Walloon ministers from preaching, was elected Professor of Hebrew, Philosophy, Classical Literature, and afterwards of Church History in the Arminian College there, a post which he held till his death, 8th January 1736. Besides an extraordinary number of other works, he wrote commentaries on the whole of the books of the Old Testament, of which those on the historical books, especially the Pentateuch, have a permanent value. They may be regarded as the early dawn of the Rationalistic movement. C. is perhaps most likely to be remembered by his *Bibliothèque Universelle et Historique* (25 vols. 1686–93); his *Bibliothèque Choisie* (1703–13); and his *Bibliothèque Ancienne et Moderne* (1714–27). See *J. Clerici Vita et Opera ad Annum* 1711 (Amst. 1711); MM. Haag, *La France Protestante* (Par. 1847–59).

Clergy (Gr. *klērikoi*, from *klēros*, 'a lot'), were so called, according to an early Christian writer, 'either because they are the heritage of the Lord, or because the Lord is their heritage.' The name was applied first to the three orders of bishops, priests, and deacons, but in the 3d c. also to the inferior orders which were then introduced—sub-deacons, readers, acolytes, exorcists, doorkeepers. In the New Testament all Christians are God's heritage (*klēros*, 1 Pet. v. 3). The idea of a sacerdotal caste, a class of persons peculiarly consecrated to God, employed on the affairs of religion to the exclusion of all worldly concerns, and to be supported by the laity, was imported from the Jewish Church with its priests and Levites. Many privileges were claimed by and conceded to the C., especially during the middle ages. (See BENEFIT OF CLERGY.) In the Church of Rome, 'secular' C. are those whose duty lies in the outer world, *e.g.*, the parish priests, and those who do not belong to any religious order, like the 'regular' C., so called from Lat. *regula*, a monastic 'rule.'

Clerical Error is, in law, an error accidentally committed in the transcription of a deed or other instrument. Where the error is not *in substantialibus*, it is not fatal to validity.

Clerk, is strictly a person in holy orders; but the term is now generally applied to any one whose chief occupation is writing as a subordinate. In English law, a C. is regarded as a superior servant.

Clerk, Parish.—An official of the Church of England. He leads the responses, and otherwise assists in the service of public worship. In cathedrals and collegiate churches there are several clerks, sometimes forming a corporate body.

Clerk of the Assize is he that records all things judicially done by the judges of the circuits.

Clerk of the Crown is an officer in Chancery, whose function it is to attend on the Lord Chancellor. He makes out writs for the election of members of Parliament. All returns are made to him. These he cannot alter, except by order of the House, under a penalty of £500—*toties quoties*.

Clerk of the Parliament Rolls is the name of an officer in each House of Parliament, who records the proceedings, and engrosses them on rolls for preservation.

Clerk of the Peace is an officer belonging to the Quarter Sessions (q. v.), whose duty it is to read the indictments, enrol the proceedings, draw the processes, and transact other business incident to the Quarter Sessions.

Clerk of Session.—The clerks of the Court of Session (see COURT OF SESSION) in Scotland are so called. There are four principal clerks and five deputies. Each principal and depute has an assistant C. The duty of the principal clerks is to attend upon and assist the Judges of the Inner House. The deputies attend upon and assist the Lords Ordinary. The principal clerks and deputies have no fees. They are paid by fixed salary. The former have £1000 a year each, the latter £550. Each assistant C. has £475 a year, and no fees.

Clerks of the Bill Chamber.—There is one C. of the Bill Chamber (see BILL CHAMBER) of the Court of Session. He is responsible for the reputed solvency of cautioners (see CAUTIONER, CAUTIONARY), and for consigned money. There is also an assistant C. and two ordinary clerks. They are all paid by salary.

Clerk to the Court of Teinds.—There is one principal and one depute C. of the Teind Court in Scotland. See TEIND COURT.

Clerk of Justiciary.—There is one principal, one depute, and one

assistant C. of the Justiciary Court of Scotland. See JUSTICIARY COURT.

Clerks to the Signet. See WRITER TO THE SIGNET.

Every court of law has necessarily a C., whose duty it is to write out the judgments and extract the decrees of the court.

Clerk, John, of Eldin, Mid-Lothian, Scotland, the sixth son of Sir John Clerk of Penicuik, obtained for himself, in 1779, a considerable reputation by the invention of the modern naval tactics of 'breaking the enemy's line'—an invention all the more remarkable that C. was not in any sense a naval man. This invention, being communicated to various naval officers, was adopted by Admiral Lord Rodney, April 12, 1782, when he obtained his great victory over De Grasse in the W. Indies, and subsequently the manœuvre was systematically employed by the other great British admirals, such as Howe and Nelson. C. published various editions of his *Essay on Naval Tactics*—the latest and most complete in 1804. An unsuccessful attempt was made by General Sir Howard Douglas, son of the captain who, under Rodney, tried the manœuvre, to prove that it was suggested to his father, not by C., but merely by the chance position of the British and French fleets. C. died May 10, 1812.—His son, **John Clerk,** born in 1757, was educated for the law, passed advocate in 1785, and soon obtained the largest practice of his time. He was raised to the bench in 1823, taking the title of Lord Eldin. C. died in 1832. He is still remembered in Edinburgh society for his social qualities and his quaint, coarse humour.

Cler'mont (the *Clarus Mons* or *Clarimontium* of the middle ages), the name of several towns in France, the most important of which is **C.-Ferrand** (the *Augustonemetum* of Ptolemy), the capital of the department of Puy-de-Dôme, on an affluent of the Allier, and connected with Paris and Lyon by railway. It is beautifully situated at the foot of a range of extinct volcanoes, surmounted by the Puy-de-Dôme. The principal buildings are the cathedral (1248), the Romanesque church of Nôtre Dame du Port, said to date from 853, the Hôtel de Ville, Hôtel Dieu, linen-market, grain-market, the hospital, the theatre, and Palace of Justice. C. has a valuable public library, museums of natural history and antiquities, and a college. It has iron-foundries and machine-works, considerable traffic in grain, wine, oil, and cheese, and a large transit trade. In the suburb of St Alyre is a fine mineral spring. Pop. (1872) 29,070. Pope Urban II. presided here in 1095 at the council in which the first Crusade was resolved on. Pascal was a native of C., and a statue has been erected in his honour. Other distinguished natives were Gregory of Tours and General Desaix.—**C.-l'Hérault,** a town in the department of Hérault, France, on an affluent of the Lergue, 23 miles N. of Agde by railway. It has manufactures of woollens, linens, verdigris, candles, &c., and an active trade in cattle and millstones. Pop. (1872) 5458.

Cleroden'dron, a genus of plants of the natural order *Verbenaceæ*, one of which, *C. Thomsonæ*, of W. Africa, is cultivated for the beauty of its flowers. *C. infortunatum*, an Indian species, is bitter and sub-astringent, and possesses antiperiodic and tonic properties. These plants are chiefly natives of tropical Asia, but they are also found in Africa and America.

Cler'us, a Beetle genus, included in the Pentamerous section of the *Coleoptera*, and in the family *Serricornes*. *C. apiarus* is common on the continent of Europe, and is found in a larval state on the young of the hive-bee. It averages about half an inch in length, and is of green colour, the *elytræ* or wing-covers being red with purple markings. The adult beetles inhabit flowers, and particularly umbelliferous plants.

Cleve'land ('the Forest City'), in Ohio, U.S., on Lake Erie, at the mouth of the Cuyahoga river. It stands on a bluff 80 feet above the lake, and is beautiful and well laid out; the streets adorned with shady trees and fine public buildings. C. has a good harbour, and carries on an extensive trade with the lakes and with the mineral fields of Pennsylvania, especially in coal, iron, and copper. It has also communication with the Ohio river by the Ohio Canal, besides having railways to all parts of the country. Shipbuilding, copper-smelting, iron-rolling, and oil-refining are large and important industries. The city is supplied with water from Lake Erie by works which cost $400,000. In the year ending June 30, 1869, the number of vessels cleared was 493, tonnage 60,486; vessels entered 554, tonnage 87,523. The taxable value of property in 1875 was $73,305,277. C. was founded in 1796, but in 1830 was only a village of 1100 inhabitants. In 1850 its population had risen to 17,034; in 1870 to 92,829; and in 1875 to 157,000.

Cleves, the French spelling of the German KLEVE (q. v.).

Clew, in ships, the lower corner of a sail. *C.-lines* are the ropes by which the C. is worked.

Clew Bay, an inlet on the coast of Mayo county, in the W. of Ireland, 15 miles deep, with an average breadth of 8 miles, containing numerous indentations which form excellent harbours, and having at its upper end an archipelago of 300 fertile islets. It has valuable fishings. Clare Island lies at the mouth of the bay.

Cli'ché (Fr.), a process by which a sharp impression is obtained from a medal die. A quantity of semi-fused metallic alloy is placed in a box under the die, which then descends forcibly upon it, causing the metal to take the finest lines of the die, which from its coldness immediately solidifies the whole impression. 'C.' is also applied to the formation of stereotype plates.

Cli'chy, a town in the department of the Seine, France, on a plain near the right bank of the Seine, and 4 miles N.W. of Paris, of which it forms a suburb. It has manufactures of white lead, chemical products, glue, and varnish. The parish church was erected in 1612 by Vincent de Paul, who was then curate of C. Pop. (1872) 14,366.

Click-Beetles, a popular name given to beetles belonging to the family *Elateridæ*, the larvæ of some species of which are the destructive 'Wire-Worms' (q. v.) of the agriculturist. The name 'C. B.' is derived from the noise they make on regaining their natural position after being laid on their backs; a spine arising from the front of the body, by means of a spring-action, enabling these insects to execute leaps, and to make the peculiar sound referred to. One familiar species of C. B. is the *Elater* or *Agriotes lineatus*—the striped species—found in hedges in summer, the larva of which is destructive to turnips and other plants.

Cli'ent. See AGENT.

Cliffor'tia, a genus of S. African bushes, belonging to the natural order *Rosaceæ*. The holly-like leaves of *C. illicifolia* are used by the Cape Boers (farmers) as an emollient and expectorant in coughs. The name *Cliffortiaceæ* is sometimes given to the *Rosaceæ* proper (including *Sanguisorbeæ*, as distinguished from *Amygdaleæ* and *Pomaceæ*).

Clif'ton, a suburb, and part of the parliamentary and municipal borough of Bristol, is built on the sides and summit of lofty cliffs (hence its name) of carboniferous limestone overhanging the Avon, and rising in St Vincent's Rocks to the height of 308 feet. The river, which is here navigable, is spanned by a suspension bridge 702 feet in length, and having an elevation above low water of 275 feet. Its mineral springs and the beauty of its scenery made it, as early as the beginning of the 18th c., a favourite watering-place, which it continues to be, though its spa has declined in favour. C. has some fine public buildings, is a favourite residence of wealthy Bristowans, and has a proprietary grammar-school, *C. College*, which at present ranks among the foremost educational institutions in England. Traces of a large Roman camp are visible on C. Down.

Climac'teric Year, a period of human life superstitiously supposed to be a turning-point in health or fortune, and thought to recur at the years produced by multiplying 7 into the odd numbers 1, 3, 5, 7, 9—to which some added the 81st year. The 63d year was called the *grand C.*, and was supposed to be well-nigh impassable by most men, being the product of the two largest odd numbers, 7 and 9.

Cli'mate, in meteorology, is the sum of all the atmospheric variations at the locality under consideration, viewed especially in their relation to and effect upon animal and vegetable life. It depends first and chiefly upon the latitude and the mean annual temperature of the latitude, receiving from this considera-

tion its usual subdivision into tropical, sub-tropical, temperate, and polar climates. Now, as a rule, the higher the latitude the lower the temperature, because the sun's rays, striking more obliquely on the surface, supply the same heat to a larger area, and therefore less to each unit of area. There are many conditions, however, which go to modify this general fact, but most, if not all of these, are due to the particular configuration of the land and sea. Thus, in the southern hemisphere, the *isothermal* lines, or lines drawn through localities whose mean annual temperatures are the same, approximate more or less to the parallels of latitude having their greatest contortions where the presence of land interferes most with the homogeneity of the surface. In the northern hemisphere, again, where the configuration of land and sea is much more irregular, the isotherms are extremely contorted. For instance, the isotherm representing a mean annual temperature of 0° C. corresponds, S. of the equator, almost exactly with the 60th parallel of latitude, suffering a slight disturbance just S. of Cape Horn; while, N. of the equator, it is traceable from the Aleutian Islands E. and S.E. over the American continent to the southerly extremity of the Labrador coast, then N.E. to Cape Farewell and to the North Cape, touching the N.W. of Iceland in its passage, then doubling southwards to the northern end of the Baltic, continuing E. and S.E. through the northern coasts of Russia and the southern districts of Siberia, undergoing a slightly northward flexure as it leaves Japan, and finally cutting through the S. of Kamchatka and across the N. Pacific.

All influences which are commonly enumerated as modifying C. may be said to depend on these four fundamental conditions: (1) the solar heat, (2) the earth's annual and diurnal motions, (3) the configuration of land and water, and (4) the character (physical and geological) of the country. It may be desirable to consider briefly the more important of these influences. The presence of aqueous vapour especially has a marked effect; for on account of its high specific heat, it tends to lower the temperature in summer and raise it in winter, thus equalising the C. Ocean currents, originating in the equatorial regions, and flowing towards higher latitudes, have the same equalising effect, as is well shown in the case of N.W. Europe, whose C., under the ameliorating action of the Gulf Stream, is much more equable than that of the corresponding latitudes on the American continent. In this connection also may be mentioned the similar influence of vegetation, and more particularly of forests. The elevation above the sea-level is another important element in the adjustment of the C.—places situated in equatorial regions (*e.g.*, Quito, the capital of Ecuador, in S. America) enjoying a fine temperate, or even, as shown by the snow-capped peaks of the Andes and Himalayas, a veritable polar C. The nature of the soil too has a very significant influence—a damp clayey soil being very much colder, because a much better conductor for heat, than a dry, sandy one. By more thorough drainage in various parts of England the mean annual temperature has been raised by several degrees, and statistics show a corresponding decrease in the death-rate arising from consumption, ague, rheumatism, and other maladies depending chiefly upon damp for their prevalence. Again, the slope and position of the land with reference to the sun and surrounding hills, and the consequent protection from certain winds, must also be taken into account. For instance, Bridge of Allan, in Scotland, owes its suitability as a resort for invalids to its protection from the east wind, and Torquay, in England, to its southern exposure. The more equable a C. is, the better, as a rule, is it suited for life; and the character of a C. is perhaps best judged of from a knowledge of the fauna and flora which flourish under its influence. From fossil testimony, we gather that in former geological epochs the C. of Europe was very different from what it is now. The rocks of the Tertiary formations indicate a sub-tropical development, even as far N. as Iceland; while the absence of organic remains in certain Post-tertiary deposits, and the occurrence of ice-markings, are unmistakable signs that Britain and France were then visited with a C. as bleak and polar as that of Greenland at the present day. In all works of any consequence on Physical Geography, Meteorology, and Geology, the conditions on which C. depends are fully discussed, and to these the reader is referred, as well as to articles GLACIERS, RAIN, SEASONS, &c., which, as parts of the Science of Meteorology, all bear to a greater or less extent upon this subject.

Cli'max (Gr. 'a ladder,' from *klino*, 'I bend,' because a ladder leans aslant), a figure in rhetoric denoting that artifice by which objects or propositions are, for the sake of impressiveness, presented to the mind of the hearer or reader in a gradually ascending series from weaker to stronger. The corresponding Latin term is *gradatio*. The converse figure is *anti-C.*, in which the ideas gradually or suddenly sink. It forms the main element in what is known as *Bathos* (q. v.).

Climb'ing Perch (*Anabas scandens*), the name given to a peculiar species of Teleostean fishes belonging to the family *Anabatidæ*, inhabiting the Ganges and other fresh waters in the E. Indies, and which have the power of leaving the water for considerable periods, and of making their way on the land, supporting themselves on their stiff spiny fins. The dorsal fin is single and elongated. The upper pharyngeal bones are divided into a number of curious labyrinthine chambers, in which moisture can be retained, for the purpose of keeping the gills moist, and of enabling them to breathe in their overland journeys. They migrate overland from their pools, when these are being dried up, in search of a fresh water supply. The name 'C. P.' has been given to this species of fish from the assertion that it is able to climb trees—the Tamul name of the creature being *Paneiri* or 'Climber of trees.' But this latter statement has not been satisfactorily determined, although there is no doubt of its land-loving habits, and of its ability to live out of water for days together. Another species allied to the C. P. is the Gourami of China. *A. scandens* is on the average 6 inches in length. These fishes are allied to the *Mugilidæ* or Mullets.

Climbing Plants, or **Climbers**. Some plants have such weak stems that, in order to rise from the ground, they must twine round other plants, or seek support for the same purpose from other objects. They may be divided, according to the means by which they attach themselves to the objects around which they twine, into:—(1) Those which specially twine around a support; (2) those which ascend by the movement of the petiole or by the tops of their leaves; (3) those which ascend by true tendrils; (4) those which are furnished with hooks; and (5) those which are furnished with rootlets. Some twine round the support from right to left (*sinuirorsal*), as in the case of the hop and honeysuckle; while in others, as in the case of the Chinese yam, the haricot bean, the great hedge bearbine (*Calystyia sepium*), &c., the twisting is from left to right (*dextrorsal*). The first form of twining is expressed in systematic works by the sign ☾, the latter by the sign ☽. Since the observations of Darwin, Unger, and others have called attention to the remarkable phenomena displayed by C. P., facts have been noted in regard to them which would almost incline us to designate some of these movements by a higher term than the mere phrase of 'vegetable irritability' would denote. For a full account of these curious 'instincts' of plants, see Darwin *On the Movements and Habits of C. P.* (1875); also *Journ. Linnean Society* (1865); and Brown's *Manual*, pp. 78, 79, 579-583.

Clin'ic Baptism (Gr. *klinikos*, from *klinē*, 'a couch'), in the early Church was private baptism administered to the sick. It was done by sprinkling instead of immersion, which was the regular mode when done in the Baptistery (q. v.).

Clink'er, a firm mass of ash and other matters which is apt to form upon the bars of a furnace in which strongly caking coal is burnt, and which in this case, by impeding the access of air to the fuel, impairs the combustion, and allows the bars to be destroyed.

Clinker or **Clincher-Built**, a term applied to boats so made that each strake of planking overlaps at its edge the strake next below it, like the slates of a roof. If the planking be made flush throughout, the boat is said to be *carvel-built*.

Clink'stone, or **Phon'olite**, a compact felspathic rock, greenish-grey in colour, and somewhat slaty in texture, which emits a clear metallic sound when struck with a hammer.

Clinom'eter, a small instrument used by surveyors for finding the slope of ground, and by geologists and others for finding the dip and strike of strata.

Clinton, De Witt, son of James Clinton, U.S. general, was born in Orange county, New York, March 2, 1769. After his

admission to the bar, he was appointed secretary to his uncle, General George Clinton, and signalised himself as a political rival of Aaron Burr (q. v.). In 1802 he was appointed U.S. senator, and in 1803 Mayor of New York city. He was several times elected by the Democrats as Mayor of New York; and was Governor of the state from 1817 to 1822, and again in 1824. C. founded many valuable institutions; but his greatest work was the Erie Canal, connecting the waters of the lakes with the Hudson. He suggested the idea, and was mainly instrumental in carrying the work to its completion. He died February 11, 1828. See Hosack's *Life of C.* (1829), and Renwick's *Life of C.* (1840).

Clinton, Henry Fynes, a most distinguished classical scholar, was born in 1781, and educated at Westminster School, and Christ Church, Oxford. He inherited a large fortune, and for twenty years (1806–26) sat in Parliament for Aldborough. His great works are his *Fasti Hellenici* and *Fasti Romani*, containing respectively a most learned and exhaustive account of the chronology of ancient Greece and Rome. Both of these works were epitomised by the author. C. died at Welwyn, Hertfordshire, 24th October 1852.

Cli'o (Gr. *Kleiō*, the 'proclaimer' or 'fame-giver'), in the Greek mythology, is the daughter of Zeus and Mnemosyne. She is the Muse of History, and is represented in a sitting attitude, wearing a laurel wreath, holding in her left hand a half-open inscribed roll of parchment, and beside her an open cylindrical chest, containing more rolls of manuscript. Sometimes she has a parchment roll in one hand and a stylus in the other. See MUSES.

Clio, a genus of Pteropodous mollusca, the familiar species of which (*C. borealis*) is named 'Whales' Food,' from the fact that the cetaceans of the Arctic seas feed chiefly upon the immense myriads of these minute forms, which they draw into their mouths. *C. borealis* averages about three-quarters of an inch in length. No mantle or shell is developed. A distinct head exists, and the gills are rudimentary. The fins by which it swims are attached to the sides of the neck. The head bears numerous tentacles. *C. australis* is another species, found in the S. Seas. These animals are nocturnal in habits. See MOLLUSCA and PTEROPODA.



Clio.

Clipp'er, a term applied generally to any sailing ship built with the object of attaining considerable speed. Almost all passenger ships, and very many merchant vessels for long voyages come into this category. Under favourable conditions of wind and weather, a C. may sail as fast as an ordinary steamer.

Clith'eroe (formerly *Cliderhow*; perhaps the Cymric *Cleddwr*, 'the rock by the water,' to which has been added the Old Eng. *hou*, 'a hill'), a manufacturing town in the W. of Lancashire, on the Ribble, 28 miles N. of Manchester by railway. It lies at the base of Pendle Hill, which rises to a height of 1803 feet, and in the vicinity is the famous Pendle Forest, a favourite haunt of the Lancashire witches. C. has extensive cotton and print industries. Its castle (now a ruin) was founded by the Lacys in the 12th c. C. returns one member to Parliament. Pop. of parliamentary borough (1871) 11,786. About 5 miles W. of C. is situated the Jesuit College of Stonyhurst.

Clito'ria, a large genus of plants of the order *Leguminosæ* (sub-order *Papilionaceæ*), widely distributed over tropical Asia, Africa, and America, but more particularly in the latter country on the eastern side of the Andes. *C. Ternatea* is originally from the island of Ternata, one of the Moluccas, but now common in most tropical countries and in European conservatories. The corollas of the blue variety yield a dye which is used in Cochin-China, though it is not permanent, and in Amboyna it is employed to colour boiled rice. The root is powerfully purgative, and in India is administered to children to promote sickness and vomiting. The butterfly-pea (*C. Mariana*) is remarkable on account of its curious geographical distribution. It is found in the southern American states and Mexico, and in the Khassia Hills in India, without being found in any intermediate place.

Clit'oris is a small body found in the external female generative organs. It is the homologue of the penis in the male. About an inch and a half long, it is concealed in the mucous membrane. Unlike the penis, it is not perforated by a canal resembling the urethra, and it has no spongy structure resembling the *corpus spongiosum* of the penis. It is a rudimentary organ in the female, and has no known function except that it becomes excited and turgid during the sexual act.

Clive, Robert, Lord, born near Market Drayton, Shropshire, 29th September 1725, was the eldest son of a lawyer of very ancient family. After a turbulent and idle boyhood, he obtained, at the age of eighteen, a writership in the East India Company's service at Madras. C. was disgusted with mercantile employment, and twice attempted suicide while in the 'Writers' Buildings.' He obtained means of study in the Governor's library. When Labourdonnais, the French Governor of Mauritius, captured Madras, C. escaped to Fort St David and obtained an ensign's commission in the Company's army. Two years later the French Governor of Pondicherry, Dupleix, took advantage of the disputed claims to the viceroyalty of the Deccan and the nabobship of the Carnatic to get himself recognised as Governor of India from the river Kristna to Cape Comorin, and the war between the English and French Companies began. It was then that C., now a commissary with the rank of captain, raised the siege of Trichinopoly by the capture of Arcot (1751), the capital of the Carnatic, which he defended for fifty days with a handful of English and Sepoys against the large army of Rajah Sahib, who was not only compelled to raise the siege with great loss, but was twice defeated in open field. Under the command of Major Lawrence, C. added to these triumphs the storming of Covelong and Chingleput. He then married Miss Maskelyne and returned in 1752 to England, where he was a good deal lionised. In 1755 he was appointed by the Company Governor of Fort St George, with a commission as lieutenant-colonel in the British army. Surajah Dowlah, the viceroy in Bengal of the court of Delhi, had just, on a frivolous pretext, attacked the English factory of Fort William, the modern Calcutta. The tragedy of the Black Hole (q. v.) roused the Madras settlement to fury, and C. was despatched with 2400 men to Bengal. Hoogly and Calcutta rapidly fell, and, assisted by Admiral Watson, C. distrusting the proposals of the Rajah, stormed the French factory of Chandernagore. A conspiracy against Dowlah, which C. carried on with the grossest deceptions, was played out on the field of Plassey, where an army of 55,000 well-appointed natives was dispersed, only 500 being slain. C. accepted from the new viceroy, Meer Jaffier, between £200,000 and £300,000. Although the act was much blamed, he was appointed by the Company Governor of the Bengal settlements, which he greatly strengthened by the defeat at Patna of Shah Alum, a prince of the Delhi family, who was threatening Bengal. The grateful Meer Jaffier gave C. the rent paid by the Company for the Bengal settlements; but soon commenced an intrigue with the Dutch factory of Chinsurah. This was promptly suppressed by the defeat of the Dutch fleet on the Hoogly, and the imposition of conditions on the Dutch factory. In 1760 C. returned to England, where he received an Irish peerage, and entered the House of Commons, where he attached himself to the Grenville party. His chief interest was still in Indian affairs: he opposed Sullivan in the Court of Proprietors, and was obliged to take his former employers into Chancery, as they had rescinded Meer Jaffier's grant of rent. Frequent revolutions and the corrupt administration of the Company's servants led to C.'s return to Calcutta in May 1765. In less than two years he succeeded in abolishing the private trade of the Company servants, and in prohibiting the receipt of presents. Their salaries he supplemented out of the Government monopoly of salt. Equally important reforms were carried out in the army, although a conspiracy of 200 officers was formed to oppose them. C. also obtained from the court at Delhi a recognition of the Company's supremacy and right to collect the revenues in Bengal, Orissa, and Behar. For a short time, however, the fiction of a native viceroy at Moorshedabad was continued. C. set an example of self-denial to his fellow-countrymen. The only large present he accepted (£60,000) he formed into a fund for the invalided servants of the Company. On his final return to England in 1767, his great services seemed to be forgotten in the general dislike with which

the nabob class were at that time regarded. The sufferings of the Bengal population from famine were contrasted with the splendour in which C. lived at Berkeley Square and Claremont. At length in 1772, the financial position of the Company having become serious, a parliamentary committee was appointed to inquire into its recent history. Chiefly owing to the eloquence of Wedderburne, the House of Commons, while affirming the general illegality of the private appropriation of military acquisitions, passed no censure on C. His health, however, gave way soon after: he became addicted to opium, and committed suicide on 22d November 1774. There are Lives of C. by Malcolm and Greig.

Cloa'ca (Lat. 'a sink') is a cavity at the extremity of the alimentary canal of birds, reptiles, and amphibians, into which the great intestine, the ureters, or ducts of the kidneys, and the ducts of the reproductive organs open. In the *Ornithodelphia*, a group containing the two genera *Echidna* and *Ornithorynchus*, there is a spurious C. common to the rectum and genital and urinary organs. In the *Didelphia*, or Marsupials, there is a shallow C., the sphincter muscle being common to the urinary and genital apertures, but there is no true urogenital chamber.

Cloaca Max'ima, a celebrated subterranean vault, the construction of which is ascribed in Roman legend to Tarquinius Priscus, by which the filth of ancient Rome was conveyed to the Tiber. It was formed by three arches, one within the other, the innermost being a semicircular vault about 14 feet in diameter, the blocks of which were united without lime. It was large enough to allow the passage of a cart loaded with hay, and Agrippa passed through it in a boat on an occasion when it was cleansed. The original C. M. extended only from the Forum to the river, but was ultimately extended as far up as the Subura, and of this extension vestiges were discovered in 1742. The expenses of cleaning the common sewers at Rome were defrayed partly by the treasury and partly by an impost called *cloacarium*. The censors were intrusted with the administration of the sewers under the Republic, but under the Empire this was vested in special officers, with the title of *cloacarum curatores*—'curators of the sewers.' The sewers at Rome were constantly flushed by the superfluous waters of the aqueducts.

Clock Bell-Metal is an alloy of copper, into which tin, lead, and zinc in variable proportions enter. Small quantities of antimony and bismuth are sometimes introduced, to give a crystalline grain and a certain tone to the bell-metal.

Clocks and Watches. See HOROLOGY.

Clog Al'manac, Rim Stock, or **Prime Staff**, an almanac or calendar of days, made generally of wood, but sometimes of horn, bone, or brass. When four-sided it contained three months on each of the edges; the days were marked by notches, every seventh by a larger notch. On the sides symbols, each linked to the proper notch by a line, indicated the Golden Number, a cycle of the moon, and festivals of saints. Some were perfect, containing the Dominical Letter (q. v.), the Prime (q. v.), and marks for all the feasts; others were imperfect, having only the prime and immovable feasts engraved on them. There was the family C. A., hanging like a modern clock or weatherglass, and the smaller one, carried in the pocket as watches or handy compasses now are. This instrument was much used in England and Denmark; but in the latter country it was generally flat, each side being divided into six columns; even six-sided ones were not uncommon, two months being notched on each edge. There also it was called a *Runic staff*, after the Runic characters used for notation. Specimens of the C. A. are to be seen in the British Museum, London; the Bodleian Library, Oxford; and St John's College, Cambridge; and a few other places.

Clogheen' (Irish Gael. *cloichin*, dim. of *cloch*, 'a stone'), a town in the county of Tipperary, Ireland, 14 miles S.W. of Clonmel, on the river Tar, at the crossing of the roads from Dublin to Cork and from Cahir to Lismore. It has extensive flourmills, as the limestone soil of Tar Vale produces rich crops of wheat. Pop. (1871) 3176.

Clog'her (Irish Gael. *clochar*, 'stony land'), a decayed episcopal city in the county of Tyrone, Ireland. It is near the Londonderry and Enniskillen Railway, 15 miles S.S.E. of Omagh, and 98 N.N.W. of Dublin, on the Launy, a tributary of the Blackwater. St Patrick is said to have been, in A.D. 444, the first bishop of the see, which is now united to that of Armagh. Pop. (1871) 1515.

Clois'ters (Lat. *claustra*, 'enclosed places'), vaulted passages connected with cathedrals and collegiate or monastic institutions, generally situated on the S. side of the church. They enclose on four sides a large area, called the cloister garth, and give covered access to the church, and to the various offices of the establishment ranged around the three remaining sides. The side-walls of the C. are in Northern Gothic generally of a design similar to the aisle-walls of a church, having windows sometimes glazed, with tracery and buttresses between; while in warmer countries the C. are generally open pillared arcades of the most graceful and beautiful design. A stone seat is often continued along one side of the C., and many of them have stalls or carrols, where the monks were in the habit of studying and copying books; and at certain hours of the day the C. formed a common place of meeting for conversation and recreation, as well as for processions to and from the church. Certain orders used the C. for interments. The prototype of the C. is to be found in the colonnade surrounding the court in front of the Basilican churches.

Clonakil'ty (Irish Gael. *Clough-na-Killey*, 'the stone-house of the O'Keelys'), a town in the county of Cork, Ireland, 26 miles S.W. of Cork. It stands at the head of a small inlet from C. Bay, and exports grain. Pop. (1871) 5084.

Clo'nes (Irish Gael. *Cluain-Eois*, 'Eos's meadow'), a market-town in the county of Monaghan, Ireland, on the highroad between Monaghan and Belturbet, 12 miles W. of the former town, and near the Ulster Canal. It is a station on the Dundalk and Enniskillen Railway, and the terminus of the Ulster line. C. has large cornmills, a brewery, and some manufactures of crochet-lace. Near the town are the ruins of an ancient monastery, which is said to date from the 6th c., a round tower, and some very old earthworks, probably of heathen origin. Pop. (1871) 4414.

Clonmel' (Irish Gael. *Cluain-meala*, 'the honey-meadow,' so called from the abundance there in old times of wild bees' nests), a parliamentary and municipal borough in Tipperary, Ireland, with a small portion in the adjoining county of Waterford. It is situated in a beautiful valley on the Suir, here crossed by a bridge of twenty arches, is a well-built town, and has a considerable trade in corn, cattle, bacon, and butter. In the neighbourhood are extensive cornmills, breweries, and a distillery. Pop. (1871) 10,112, of whom 74 reside in Waterford. C. returns one member to Parliament. The town was the birthplace of Sterne, and the scene of Smith O'Brien's 'insurrection' in 1848.

Clontarf' (Irish Gael. *Cluain-tarbh*, 'the meadow of the bulls'), a town in the county of Dublin, Ireland, 3 miles E.N.E. of Dublin, a favourite sea-bathing place, and famous in ancient Irish history as the scene of the defeat of the Danes by Brian Boroimhe in 1014. Pop. (1871) 3442. C. had a 'priory' as early as 550, which afterwards came into the hands of the Knights Templars, and is now a Carmelite monastery. C. Castle, recently burnt, is said to have been one of the finest specimens of antiquity in the British Isles.

Cloots or **Clootz, Jean Baptiste**, born at Val-de-Grace, near Clèves, June 24, 1755, and educated at Paris, conceived the idea of making that city the metropolis of the universe, and abolishing national distinctions. Under the assumed name **Anacharsis**, he traversed Europe, announcing his doctrine, and losing great part of his inherited wealth. Returning to Paris, he renounced his rank (of baron) in the Prussian nobility, and assumed the title of 'orator of the human race,' in which capacity he assisted at the absurd ceremony of introducing fictitious delegates from all foreign nations to the Assembly. After the September massacres he was elected a deputy, and in the interests of his universal republic he savagely called for the death of the King. A treatise of his in support of Mohammedanism was gravely approved of by the Assembly. At last Robespierre, feeling that the Hébertist party was threatening not only the Jacobins but the Republic, denounced C. as too rich, a foreigner, and an atheist. C. was executed 23d March 1794. ¶ His writings are, like himself, curious, but of no consequence.

Close, a term used in heraldry in connection with birds addicted to flight, as the eagle and falcon, indicating that the wings

are not expanded, or *disclosed*, which is the technical term. C. applies also, in the same art, to barnacles or bits for horses, when they are not extended.

Close-Hauled, in navigation, is the manner in which a ship's sails are arranged when she is wanted to sail as nearly in the teeth of the wind as possible.

Clos'et, in heraldry, a diminutive of the Bar (q. v.)—one-half of its width.

Clotaire, the French form of the name of several Frankish kings of the Merwing or Merovingian dynasty. See MERWINGS.

Clothes-Moth (*Tinea*), the name given to various species of Lepidopterous moths, the young or larvæ of which destroy cloths, furs, and other fabrics, by biting them and otherwise destroying them, for the purpose of forming cocoons or pupæ-cases from the materials. Of this genus of moths (included in the sub-order *Heterocera*, and in the family *Tineina*), the *T. destructor*, *T. tapezana* of woollen fabrics, and the *T. pellionella* of furs, are familiar species; whilst *T. granella* or the Corn Moth (q. v.) is found in granaries and libraries also. *T. destructor* is of a buff colour; *T. tapezana* has the front wings black at their roots and the rest of the wings white; whilst in *T. sarcitella*, another common species, the colour is a silky grey, the head and chest being white. The antennæ are filiform, and the larvæ or caterpillars have eight or ten pro-legs. By means of their sharp jaws the larvæ nip out the fabrics in which they live, and amid which the female moth has deposited her eggs. Exposure to air, and saturation with the odour of camphor or spirit of turpentine, are the most effectual means for destroying these forms. But free exposure to currents of air and cleanliness are the surest preventives from their attack.

Clo'thing, Army, is a department of the British military system. Formerly the colonel of the regiment was paid so much a year for clothing it. This system, as was to be expected, led to gross abuse. The colonel contracted with a tailor for a wholesale supply at lowest possible price; the officer making a profit, it used to be calculated, of fully fifteen shillings per man. The disasters of the early part of the Crimean war gave rise to a national demand for reform in the system. Under the royal warrant of 21st June 1855, the troops are clothed at the direct expense of the state, the colonels receiving compensation for the loss of their former perquisite. The cost of clothing a complete regiment of the line is about £2500 a year. The cost for the whole army was, in 1873, £923,078, of which £180,000 fell to the Government of India. The cost of a uniform for a private in the line is £2, 15s. 4d.; for a Life-Guardsman it is £8, 15s.

Clothing, Navy. In the royal navy a certain sum is subtracted from the pay of the seamen to meet the expense of their clothing. In 1859, with the view to facilitate the manning of the navy, the Admiralty made the following offer:—To every man on his first entering the navy for ten years' continuous service, and to all boys on being advanced to man's rating, a suit of clothes, consisting of the following made-up articles:—A blue cloth jacket (No. 2 cloth), 17s. 8d.; a pair of blue cloth trousers, do., 11s. 7d.; a blue serge frock, 8s. 6d.; a duck frock, 2s. 9d.; a pair of duck trousers, 2s. 7d.; a black silk handkerchief, 2s. 10d.; and a pair of shoes, 6s. 7d. Seamen provided already with proper costume are to receive the money value of the above —£2, 12s. 6d.

Clo'tho, in ancient mythology, one of the three Fates or *Parcæ* (q. v.).

Clotho, a genus of *Arachnida* (q. v.) or Spiders (q. v.), inhabiting the S. of Europe and N. of Africa, which construct a curious tent-like habitation of conical shape, fastened to rocks and in crevices; egress and ingress being obtained through a curious doorway. The exterior of the tent is purposely stained for concealment, and it is fastened securely by cord-like structures to its basis of attachment. *C. quinquemaculata* is a familiar species, about half an inch long, and coloured black on the abdomen. Another is *C. Durandii.*

Cloud, St, a town in the department of Seine-et-Oise, France, [illegible] slope of a hill on the left bank of the Seine, 6 miles S.W. of Paris. The name C. is a corruption of Hlodoald, a grandson of Clovis (Hlodowig), who, forced to become a monk, took up his residence at *Novigentum*, the modern St C., and was afterwards canonised. Its principal attraction was its splendid château, built by Mazarin, long the residence of the Dukes of Orleans, and the scene of many memorable historical events. Bonaparte was here named First Consul in 1799, and here Charles X. signed the famous ordinances of July 1830. It was the headquarters of the Allies from April 7 to June 3, 1814, and also of Blucher in 1815 during the siege of Paris. It was almost wholly destroyed by the fire of the French artillery, 13th October 1870, as it was believed to be the headquarters of the German staff. Pop. (1872) 2378.

Cloudberry (*Rubus Chamæmorus*), a plant of the natural order *Rosaceæ*, allied to the bramble, raspberry, &c., bearing an agreeably flavoured fruit, greatly used for preserves in Norway and Sweden, where it is common. It is also found, though not so plentifully, in high situations in Britain. The Antarctic representative of it is *R. geoides* of Tierra del Fuego and the Falkland Islands.

Clouds. Moisture is always being evaporated from all points on the surface of land and sea: its rate of evaporation being in direct ratio to the dryness of the atmosphere, and in inverse ratio to its density. The amount of moisture is shown by the wet-bulb thermometer, which gives the temperature of evaporation. 186,240 cubic miles of vapour are annually raised from the surface of the globe. Although the southern hemisphere possesses three times as much water as the northern, yet partly by the direction of the trade-winds, partly from the superior condensation-power in the N., more rain and fog occur there. There is absolutely less vapour in the atmosphere in January than in any other month; while in July, on account of the heat, the evaporation is greatest. The chief effect of moisture in the air is to obstruct the passage of the sun's heat; there is also considerable absorption of heat on evaporation. In the region of C., which is stated by Kämptz to be from 1300 to 21,320 feet, but which balloon observations extend to an elevation of perhaps 10 miles for light cirrus, the cloud-air is dry, the moisture being condensed by the colder air into C.: these C. prevent the free radiation of heat, and thus obstruct the formation of dew on the earth. The quantity of C. manufactured out of the invisible vapour depends on the differences of the air currents in temperature, moisture, and velocity. In Britain, the heavy E. wind, or polar current, forces upwards and transforms into dense black C. the light and moist S.W. wind. In the balloon observations at Kew, the temperature of the cloud-stratum, varying from 2000 to 3000 feet in thickness, was found to be the same at the top and at the bottom. As a general rule, the cloud-stratum is higher over land than over water, and increases in height with the oxygen of the air, *i.e.*, distance from the sea. In intense cold, C. often consist not of vapour, but of small crystals of ice. The appearance of a cloud depends on its being connected with an ascending current of vapour; when this ceases, the cloud is formed, and immediately begins to dissolve. C. also, if near the earth, imitate the depressions and elevations which they extend over. There is no radical difference between C. and fog, the latter being always close to the ground, which is then generally moister and warmer than the atmosphere. The *cirrus*, or cat's tail, is the highest cloud; it consists of long white silver horizontal bands, perhaps containing snow or ice. Travelling in the direction of its length, it seems stationary. Their parallelism has been assigned to electrical conditions. The *aurora* is supposed to be connected with them; it is in this region that halos and parhelia are formed. The *cumulus* is the rounded, dense, white, mountainous cloud of the daytime. They move in currents near the earth, and are in fact formed from the ascending air which has been heated on the earth's surface. In the evening they often mass themselves and deepen in colour. Still lower is the stratus or horizontal band which forms at sunset and disappears in the morning. It includes the white and grey mists formed in valleys and over marshes. There are four subordinate forms of C.—the *cirro-stratus*, a compact structure of filaments, resembling in outline and position the *cirrus*; the *cumulo-stratus*, a mass of C., having at sunrise a black or bluish tint on the horizon, and passing into the *nimbus*, or rain and thunder cloud, which has a uniform grey tint, fringed at the edges; and the *cirro-cumulus*, which is a combination, of course in endless variety, of the *cumulus* and the *cirro-stratus*.

C. move much faster than the wind at the surface of the earth; the rate of 109 miles an hour has been observed at Edinburgh, and the rate of 72 miles when the wind was blowing at 42 miles an hour. See Mrs Somerville's *Physical Geography* (6th ed. Lond. 1870), and Buchan's *Meteorology* (2d ed. Edinb. 1868).

Clough, Arthur Hugh, an English scholar and poet, was born at Liverpool, 1st January 1819, educated at Rugby under Arnold, passed to Balliol College, Oxford, and was elected a fellow of Oriel in 1842. The theological *fever* was strong at the time, and for a moment it seemed as if C. would catch it; but his spirit was too exquisitely susceptible of living impressions, and his mind too speculative, or rather too critical, to be long enthralled by 'archæological formulas.' The result was that he went the other way, and his brief career was mainly shaped by his antagonism to the 'form of thought which Oxford exacted of her children.' In 1848 he resigned his fellowship, and in the same year, a little earlier, published the *Bothie of Tober-na-Vuolich*, a 'true long-vacation pastoral,' in classical hexameters, instinct with the finest aroma of elegant culture, the bright joys of college friendship, the humour, sympathy, sarcasm, and luminous talk of youth, relieved by picturesque descriptions of Highland scenery and delineations of Highland character. The work is imperfect in art, and is now beginning to fade from the memory; but at the time it was thought to indicate a new poet. Next year (1840) appeared his *Ambarvalia*. After leaving Oxford, C. travelled in France, Italy, and America, was appointed an examiner in the Education Department of the Privy Council in 1853, and in 1856 secretary to the Commission of Report on Military Education. His health now gave way; after visits to Greece and Constantinople, and a short return to England, he was again ordered to the Continent; but was carried off by malaria fever at Florence, 13th November 1861. C.'s nature was singularly pure, tender, and strong, and his talent incomparably greater than his fame is likely to be. See *Poems by A. H. C. with a Memoir*, by F. T. Palgrave (Lond. 1862).

Clouted or **Clotted Cream**, a delectable luxury, prepared by boiling milk on which the cream has risen, and skimming off the cream, in which a quantity of coagulated casein becomes entangled by boiling. The S.W. of England, especially Devonshire, is noted for its C. C.

Clove, or **Culilawan Bark** (see CINNAMON), is a name also applied to the bark of *Myrtus caryophyllata*, a native of Ceylon and the Mascarene Islands.

Clove Gilliflower, the aromatic scented double-flowered varieties of *Dianthus Caryophyllus*.

Clove Nutmeg, the fruit of *Agathophyllum aromaticum*, one of the *Lauraceæ*, which is aromatic, though the kernel which it encloses is of an acrid caustic taste. The leaves are used in Madagascar as a condiment.

Clo'ver, or **Trefoil** (*Trifolium*), a genus of plants belonging to the order *Leguminosæ* (sub-order *Papilionaceæ*). There are from fifteen to twenty British species of *Trifolium*; about one half are pasture plants, the rest mere weeds, of no economic importance. The cultivated species of C. are—The red C. (*T. pratense*), the zigzag C. (*T. medium*), the carnation C. (*T. incarnatum*). All the above have red flowers. The following species have pinkish or white flowers:—The Alsike C. (*T. hybridum*), the white or Dutch C. (*T. repens*); while *T. procumbens* and *T. filiforme* have yellow flowers.

The red C. is much employed as a 'shifting' crop, either by itself or in the mixtures known to the farmer as 'seeds.' It is now so much a cultivated plant that it is found difficult to make it stick to lands as perfectly as it once did: such soils are described as 'C. sick.'

The zigzag C., so called from the angular bends at each joint of the stalk, is a lover of sandy soil, and is probably only a variety of the red or broad-leaved C. It is usually known by the seedsmen as the 'cow grass,' though it is rare to find two seedsmen supplying the same plant under that name. The carnation or Italian C. is an introduction from the Continent, and is used on upland soils upon the white-crop stubble sown in the autumn. There are several varieties of it.

The Alsike C. is also a Continental form. From possessing characters intermediate between the red and the Dutch C. it gets its name of *hybridum*, though its hybridity is not admitted by botanists. It is a good pasture grass. The Dutch C. is a valuable feeding plant in dry and thin soils. *T. procumbens*, the hop or procumbent trefoil, is a different plant from the hop trefoil of the farmer (which is *Medicago lupulina*). *T. filiforme* is of little importance (Professor Buckman). Bokhara C. is *Melilotus leucantha*; bush C. and Japan C., American names for *Lespedeza*; prairie C., an American name for *Petalostemon*; Soola C. and Maltese C., *Hedysarum coronarium*; sweet C., an American name for *Melilotus*. See MEDICK, MELILOT, and SHAMROCK.

Clover Weevil (*Apion*), a genus of Coleoptera or Beetles of the section *Pentamera* and family *Rhynchophora*. This insect has, therefore, the head prolonged to form a *rostrum* or *beak*, and derives its name from its feeding on the leaves of the clover, the larvæ eating into the clover flowers. *A. africans* infests the red, and *A. flavipes* the white clover. The former is about a line or a little more in length, and is coloured of a dark-blue or blackish-blue tint.

Cloves. See CARYOPHYLLUS.

Clo'vis, the Latinised form of the name of the Frankish King *Hlodowig* (q. v.).

Cloyne (Irish Gael. *Cluain-uamha*, 'the meadow of the cave'), a town in the county of Cork, Ireland, 15 miles E. by S. of Cork. Its cathedral dates from the 13th c. C. was once a separate bishop's see, but was re-united in 1835 with that of Cork, from which it had been disjoined in 1678. The famous Berkeley was Bishop of C. There is little or no trade. Pop. (1871) 1235. St Colman MacLenin founded a monastery here in 604, and the cave from which the place is named is still to be seen.

Club (which has been conjecturally derived from the Old Eng. *cleofian*, 'to cleave,' and Welsh *clapiaw*, 'to form into a lump'), may be applied to any voluntary unincorporated society possessing a common fund, derived from the contributions of its members, and generally managed by a committee, who are not entitled to make their constituents liable for any expenses beyond the purposes for which the C. was formed. Clubs for dinner in common were popular in Athens, and eating in common was a prominent feature in the early religious or social *gilds* (a word connected with the Welsh *gwyl*, Breton *goel*, and Gaelic *feill*, 'a feast or holiday'). Thus the gild of Abbotsbury had a yearly banquet, to which the poor were admitted, the members being obliged to furnish so much bread 'well bouted and thoroughly baked.' Support and nursing of sick gild brothers, burial of the dead, and performance of religious services, were also objects of the early gilds. This common meal has been derived from the old Teutonic sacrificial banquet, and has been compared to the Greek *eranoi* (see Bekker's *Charicles*, ii. 239) and the banquets of the Roman *collegia*. These fraternities were spread all over Catholic Europe in the middle ages, there being eighty in Cologne and one hundred in Hamburg. One of their ceremonies is curiously preserved in 'the march of the members of the English benefit societies to morning service in their church before the midday dinner, the cricket-match and games of the afternoon, and the evening dance.' As the later frith-gilds, gilds-merchant, and trade-unions all in their time acquired a corporate existence, they seem hardly to fall under the term C. It would, of course, be impossible to mention the objects, charitable, political, convivial, and religious, for which clubs have been formed. Among others, we may note the 'Mermaid' of Shakespeare; the 'King's Head and Green Ribbon C.' of the Shaftesbury clique; the 'C.' of Presbyterian and Tory Jacobites, which organised in Penston's Tavern the opposition to the Revolution settlement in the Scots Parliament of 1689-90. Specimens of the fantastic club are the 'Calf's-Head C.,' which (as late as 1735) used to dine off calf's-head, in contempt of the memory of Charles I., solemnly burning the *Ikon Basilikē*, and swearing republicanism over Milton's *Defensio Populi Anglicani*; and the 'Ugly C.,' celebrated by the *Spectator*, of which the qualifications of members were defined by an 'Act of Deformity.' Early in the 18th c. the Hell-Fire Clubs, which used Tartarean names, and burned sulphur at their blasphemous meetings, were denounced by an Order of Council (28th April 1721). In the latter half of the same century the celebrated convivial clubs of 'The Society of Bucks' and 'John Shaw's Punch-House' were formed at Liverpool and Manchester respectively. The 'Scramble C.,' and the 'Oyster and Parched-Pea C.' of Preston (which included among its office-bearers an Oystericus and a Clerk of the Peas), belonged to the same period. Among the political clubs of the period of the French Revolution, may

be mentioned the *C. des Enragés*, Breton C., *Société Publicole*. The 'Breton' developed into the 'C. of Friends of the Constitution,' and, after it met in the hall of the Jacobin Convent, the 'Jacobins,' who, known as the *Société Mère*, had 300 affiliated clubs in France. Barnave, Mirabeau, and Robespierre belonged to it. Still more violent were the 'Cordéliers,' among whom were Desmoulins and Danton. Lafayette's C. was the *Feuillans*, or 'Club of 1789, Friends of the Monarchic Constitution.' Of the same complexion was the *C. des Monarchiens*. It was the 'Electoral C.' which, meeting at the Hôtel de Ville, constituted itself a provisional municipality, and, as the affair of the Bastille approached, a permanent committee for arms. Clubs for amusements, such as cricket, boating, chess, debating, are now common. The London 'Four-in-Hand C.' is perhaps the most aristocratic. In France, Italy, Switzerland, and England, Alpine clubs have existed for many years; their *Transactions* contain much interesting description and some scientific observation. Dr Ball and Mr Tucker have been the most successful members of the English Alpine C. Their chief advantage lies in the certainty of reliable guides and experienced companions. In 1812 the 'Roxburghe C.,' for the printing or reprinting of a limited number of copies of rare and interesting books or documents, was formed on the occasion of the public sale of the Duke of Roxburghe's library; it was followed by the Maitland, Spalding, and Bannatyne clubs in Scotland.

Among the great London clubs ought to be mentioned the 'Rota Coffee C.' in New Palace Yard, to which Milton, Marvell, and Harrington belonged; the 'October and March C.,' consisting of Tories under Harley and St John; the 'Kit-Kat C.' in Shire Lane, to which Halifax, Marlborough, Walpole, and other Whigs belonged; 'Almack's (originally 'Brooke's') Chocolate C.,' founded in Pall Mall in 1764; 'White's,' removed to St James Street in 1736, to which Chesterfield, Cibber, and Bubb Doddington belonged; 'Turk's Head C.,' to which in 1763 Reynolds, Johnson, Burke, and Goldsmith belonged, removed to Thatched House, and now the 'Literary C.;' 'Cocoa-Tree C.,' where Smollett did his election bribing; 'Beefsteak C.,' founded, with the motto 'Steaks and Liberty,' by Lord Peterborough in honour of Peg Woffington, to which Colman and Garrick belonged, and from which Wilkes was expelled for his *Essay on Woman*, 'Will's C.,' where Dryden talked; and 'Button's C.,' frequented by Addison.

Clubb'ing, a disease affecting the roots of cabbages and allied plants, the result of which is that the whole force of vegetation is carried upwards to the leaf and stem, causing the destruction of those parts. It is a local disease, and probably depends upon peculiar conditions of the soil. Mr Berkley recommends, as the most effectual preventive of it in districts subject to the disease, to put a small quantity of wood ashes into the hole in which the root of each plant is placed.

Club-Foot, or **Tal'ipes**, may be due to the contraction of certain muscles, or to the paralysis of others. It is generally congenital, but is sometimes the result of disease or destitution. Four kinds are usually described by surgeons. 1. *Talipes equinus*. The muscles of the calf are contracted, the patient walks on the front of the foot, and the heel is raised from the ground. This kind is usually a result of teething. 2. *T. varus*, the most common form of C.-F. The patient walks on the outer edge of the foot. 3. *T. vagus*, a rare form, compelling the person to walk on the *inner* aspect of the foot. 4. *T. calcaneus*, in which the person walks on the heel. Sometimes we find several of these forms in the same foot. The proper treatment consists in dividing the tendons of the contracted muscles by a thin knife underneath the skin, and applying means to keep the limb in position. In children C.-F. is always curable.


Club-foot.

Club-Grass, a common name for *Corynephorous*, a grass belonging to the oat tribe (*Avenæ*), by some not considered distinct from *Aira*. Though rare in England, it is generally diffused throughout the continent of Europe.

Club-Houses, in London, Law Regarding. It is now settled (Fleming *v.* Hector) that these have no legal character similar to commercial partnerships or joint-stock companies, and that the members are not liable for the acts of their secretaries, stewards, or committees.

Club-Moss. See LYCOPODIACEÆ.

Club-Rush. See SCIRPUS.

Clupei'dæ, a family of Teleostean fishes belonging to the sub-order *Malacopteri*, and including the herrings, pilchards, sprats, sardines, anchovies, &c. It is distinguished by its members possessing scales of large size, by the wide mouth, into the formation of which both maxillary and inter-maxillary bones enter; by the single dorsal fin, and by the absence of a second soft or *adipose* fin. Most of the C. possess numerous *pyloric cæca*, or appendages to the stomach. The ventral fins are abdominal in position (*Abdominalia*). The Air-Bladder (q. v.) communicates with the throat by a duct. Sometimes the belly is rendered serrate by the presence of irregular scales.

Clupesoc'idæ, a family of Teleostean fishes, included in the Malacopterous sub-order, and allied to the Herring family (*Clupeidæ*, q. v.), and to the Pikes (*Esocidæ*). The members of this group are both marine and fresh water in habits. None are found in British waters. The genera *Arapaima*, *Heterotis*, and *Butirinus* are examples of the C., which is not, however, regarded as a typical group by some ichthyologists.

Clu'sia, a large genus of tropical American trees or shrubs, the type of the natural order *Clusiaceæ* or *Guttiferæ*, so named from Charles de l'Ecluse or Clusius, a famous botanist of the 16th c. *C. grandiflora*, with its large leaves, from 7 inches to a foot in length, and white flowers 5 or 6 inches in diameter, is one of the beautiful trees of the tropics. *C. insignis*, or wax-flower, is a Brazilian and Demerara species, whose flowers excrete a quantity of resin, which, when rubbed with the butter of the chocolate-nut, is used by the Brazilian women to alleviate the pain of a sore breast (Von Martius). A similar resin, yielded by *C. alba*, *C. rosea*, and *C. flava*, of the W. Indies, is used by the Caribs for painting the bottom of their canoes. *C. Galactodendron* is one of the Palo de Vaca, or 'cow trees' of Venezuela and other portions of S. America, so called from the milky juice which exudes from incisions made in the bark being used as a substitute for milk. It is affirmed by the credulous that the 'milk' flows more fully just before the full of the moon; one tree will yield a quart in an hour. The milk is nourishing, though the use of it leaves a sensation of astringency on the lips and palate. *C. Duca* yields the duca resin of Colombia, which is burnt for the sake of its agreeable odour. Many of the species are epiphytes—*i.e.*, parasites on the stems of other trees. Altogether about thirty species are described.

Clusia'ceæ, or **Guttif'eræ**, a natural order of trees or shrubs belonging to the Dicotyledons (division *Thalamifloræ*), natives of the humid tropics of S. America. There are thirty-two genera, and about 150 species described. Most of the plants have acrid properties, and yield a yellow resin. Among the chief and common plants of the order are Gambooge (q. v.), Mangosteen fruit (*Garcinia Mangostana*), the American Mammee apple (*Mammea Americana*), bitter or Weandee oil (from *C. inophyllum* of India), the butter-tree of Sierra Leone (*Pentadesma butyracea*), &c.

Cluso'ne, a town in the province of Bergamo, N. Italy, near the Serio, 17 miles N.E. of Bergamo, has linen manufactures, and a trade in iron, copper, vitriol, corn, &c. Pop. 5500. C. is also the name of a small river of N. Italy, which joins the Po some 18 miles S. of Turin.

Clus'tered Col'umns, or **Compound Piers**, one of the richest features in Gothic ecclesiastical architecture, when the shafts or columns are attached to each other sometimes for their whole length, at other times only at the base and capital. C. C. are susceptible of very effective adornment, as with floriated fillets.

Clu'tha, or **Mol'yneux**, the largest river in New Zealand, issues from Lake Wanaka, in the province of Otago, in 44° 35′ S. lat., 169° 20′ E. long., and after a S.E. course of 200 miles, falls into the S. Pacific in 46° 18′ S. lat., 169° 38′ E. long. Its principal tributaries are the Kawarau (draining Lake Wakatipu), Manuherikia, and Pomahaka. The C. is a very deep and rapid river, and was computed by the late Mr Balfour, colonial marine engineer, to discharge 1,690,000 cubic feet of water per minute.

Cluy'tia, a genus of Euphorbiaceous plants, natives of Africa, and found in great abundance at the Cape of Good Hope. *C. lanceolata* is said to be used in Abyssinia as a cure for dysentery in cattle.

Clwyd, a Celtic word found both in the Cymric and Gaelic tongues, and derived from an adjective meaning 'strong.' This adjective is seen in the names of several rivers in Scotland and Wales—*e.g.*, the 'Clyde' in Lanarkshire, and the 'Cluden' near Dumfries; the 'C.,' 'Cloyd,' and 'Clydach,' in Wales, which were probably so named from the strength or rapidity of their current. By far the largest and most important is the Scottish river, the Clyde (q. v.). The only other requiring notice is the C. of N. Wales, which rises in the Bronbanog Hills, in the S.W. of Denbighshire, flows in a northerly direction past Ruthin, St Asaph, and Rhyddlan, and falls into the Irish Sea between the shires of Denbigh and Flint, after a course of 30 miles.

Clyde, a river of Scotland, rises in an amphitheatre of the Lowther Hills, in the extreme S.E. angle of Lanarkshire, near the sources of the Tweed and the Annan. It has its origin in the Daer Water and several other mountain streams, of repute among anglers. After flowing N. for some 20 miles, and sweeping round the E. base of Tinto Hill, it has a sinuous course in a north-westerly direction through the picturesque Dale of C. or Clydesdale, till it expands into a broad estuary, and eventually into a firth of the same name. Its only considerable tributaries are the Douglas, Avon, Calder, and Leven, and the principal towns it passes are Glasgow, Lanark, Hamilton, Renfrew, Dumbarton, Helensburgh, Greenock, and Gourock. The Vale of C. is famous alike for its orchards, its coal and iron, and its horses. By far the most singular feature of the upper C. itself is its series of romantic falls near Lanark, where the bed of sandstone and shale has been ploughed into deep gorges and gloomy defiles, through which the river descends some 230 feet in less than 6 miles. The falls, which are beautifully flanked with savage cliffs and wooded slopes, are four in number—(1) Bonniton Linn, consisting of a single leap of 30 feet; (2) Corra Linn, the most magnificent of the four, having one cataract of 90 feet, and a total descent of 120; (3) Dundaff Linn, a miniature cascade of 10 feet; and (4) Stonebyres, forming three successive falls, like Corra Linn, of 70 feet. At Glasgow the C. becomes navigable for large vessels, and begins to assume the appearance of a great trading and shipbuilding river. Its estuary rapidly widens below Dumbarton, until between Greenock and Helensburgh it has a width of 4 miles; but the promontory of Roseneath here hinders its further extension, standing well out into the channel, and separating the Gare Loch from Loch Long, both arms of the estuary stretching in a northerly direction. After sending off Loch Long to the N. and Holy Loch to the W., the main stream turns abruptly S., opens into the Kyles of Bute, but continues along the coast of Renfrew and Ayr, until it merges in the Irish Channel at Ailsa Craig. Its length to Glasgow is 75 miles, and its further course is 48 to Cantire, where it is considered that the Firth of C. begins. The river has a basin of 1500 sq. miles. In 1859 a fort (Mathilda) was erected about a mile to the W. of Greenock for the defence of the C. Sir John Hawkshaw issued a report on the pollution of the C. and its tributaries in 1876.

Clyde, Lord. See CAMPBELL, SIR COLIN.

Clydesdale Horse, a breed which originally belonged to Lanarkshire and Ayrshire, but whose great strength, fine action, noble form, and substance have made it much appreciated in England, on the Continent, in America and Australia. It is the best workhorse in the world, and as much as £1500 has been given for one. See HORSES.

Clys'ter (from Gr. *kluzō*, 'I wash out'), or **En'ema** (Gr. *enema*, 'an injection,' from *eniēmi*, 'I send in'), is a medicine which is injected up the lower bowel in the liquid form. It is used when we wish to empty the bowels speedily, or when the patient cannot swallow, as in apoplexy or paralysis; also for the purpose of conveying into the system stimulant or nourishing substances. Turpentine is frequently administered as a C. to arouse from coma, opium to relieve pain, and brandy and beef-tea to nourish, &c.

Clytæmnes'tra, according to Homer, a daughter of Tyndareus and Leda, and half-sister of Helen, became the wife of Agamemnon, to whom she bore Orestes, Iphigenia, and Electra. During her husband's absence at Troy she formed an adulterous connection with Ægisthus, and on Agamemnon's return she murdered him in the bath; a crime for which, seven years afterwards, her own son Orestes took her life.

Cnidos'colus, a genus of *Euphorbiaceæ*, consisting of shrubs or herbaceous plants belonging to Africa. *C. stimulans*—a native of the Southern States of America—on account of the lacerated segments of the leaves, which are covered with spreading hair, stinging the naked feet of the negroes, is well known as 'Tread Softly.' Its tuberous roots are eaten like those of cassava. *C. quinquelobus* stings even more terribly, and on this account is shunned as a cultivated plant. In some cases the persons so stung will fall down, and remain quite unconscious for some time. In every case an excruciating pain is experienced, which, according to Mr Black, from whom we take this account, 'lasts for some days, and the parts swell, and sometimes continue swollen, accompanied by an itching sensation, for months.'

Cni'dus, or **Gni'dus**, anciently a city of Caria, Asia Minor, on the W. extremity of the peninsula of Triopion (now Cape Krio), which formed the S. side of the Ceramic Bay. A Lacedæmonian colony, and a member of the Dorian Hexapolis, it soon acquired wealth, and patronised art—one of its temples being adorned by the famous naked Venus of Praxiteles. The larger of its two ports was formed by transverse moles carried out into the sea, one of which is still almost entire. Eudoxus, the mathematician and friend of Plato, was a native of C.

Coach. The word is said by Taylor to be an English form of the Ger. *kutsche*, which itself comes from the Magyar *kotczy*, while that again has been formed from *Kottsee*, the name of a town in Hungary. The C. is a box-like carriage, with four wheels, mounted on springs or suspended on leathers. Carriages were employed by the ancients in travelling. The *carpentum* of the Romans was a richly decorated two-wheeled vehicle, covered with an awning, and chiefly used for the conveyance of Roman matrons in the days of the Republic, and during the Empire a four-wheeled carriage, called *carruca*, was invented; but there is no reason to suppose that either of these was suspended on leathers. Towards the end of the 13th c., the Queen of Charles of Anjou entered Naples in a *caretta*, a small highly-adorned car; which, according to Beckman, is the first instance of the use of a C. in Europe. In the 16th c. coaches commonly appeared in European state ceremonies, particularly in Germany; and in 1588 they had become so general that the Duke of Brunswick forbade his vassals to use them, in so far as they discouraged the more manly and skilful exercise of horsemanship. The first coach made in England was built for the Earl of Rutland by Walter Quippen in 1555. In 1556 he built one for Queen Mary, and in 1564 a state-coach for Queen Elizabeth, which on account of its jolting she discarded for a Dutch coach imported for her in 1570. Within the next fifty years German coaches came into extensive use in England. Private coaches were not uncommon at the end of the 16th c., and at this period it appears that carriages were divided into two classes, coaches and *caroches*, the latter being larger and heavier, though considered more stately and more appropriate for court pageantry than the former, which were relegated to the country. Carriages were quite common throughout Europe generally in the two succeeding centuries. Hogarth has embalmed in his pictures the appearance of the sumptuously carved and gilt carriages of his time, and they certainly look ill-adapted for rapid motion, highly perched as the body is on ... supports between the two widely separated pairs of wheels. An example of English coachmaking of the 17th c., still in a condition for use, exists in the 'Speaker's C.' It is made of elaborately carved oak with richly painted and gilt panels, and measures 14 feet from axle to axle, the total length being 19 feet. The royal state C. was constructed, for

the coronation of George III. in 1761. Its frame is composed of eight palm-trees whose branches support the roof, which is surmounted by a crown, borne by boys emblematical of the three kingdoms. Various figures support the body and the coachman's box, his footboard being a scallop-shell, and the whole structure is adorned with carved trophies, painted allegorical and mythological designs, &c. Its length is 24 feet, breadth 8¼ feet, and height 12 feet.

Hackney Coaches first appeared in the streets of London in 1605. They do not derive their name from Hackney, in London, as is commonly supposed, but from the French *haquenée*, a cob-horse, the vehicle to which the animal was harnessed being called *coche-à-haquenée*. The *hansom* was patented in 1834, but since then many improvements have been effected on the original design. About the same time a four-wheeled vehicle was introduced into London, and usurped the name *cab*, which previously belonged to the two-wheeled *cabriolet* imported from Paris about 1820. It is said that Lord Brougham was so fascinated with the general appearance of the 'cab,' that he ordered a better finished C. of the same shape, which has since borne his name, and become the national carriage of England. Carriage-building is carried to greater perfection in England than in any other country, and of the numerous varieties of pleasure carriages, the *brougham, landau*, and *barouche* need only be mentioned for their symmetry and elegant form, and combination of strength with lightness. The chief kinds of wood employed in carriage-building are ash for framework of bodies, Honduras mahogany for panelling, and white pine for seat-boards and under part of bodies; the wheel spokes are formed of sapling oak or hickory. Canadian black walnut wood has recently been found to be an excellent substitute for most of these woods. The painting of a carriage is a most tedious process, and the beautiful glossy colour is only acquired by a great number of successive coats of paint and varnish, each layer after drying being smoothed and polished before another is applied. See Thrupp's *History of Coaches* (Lond. 1877).

Coadju'tor, a subordinate fellow-worker. In ecclesiastical law the word is specially applied to the assistant to a bishop.

Coagula'tion. There are many substances which exist in a soluble and insoluble condition. The act of passing from the soluble to the insoluble state is termed *C.* The spontaneous C. of the fibrine contained in blood — the clotting, as it is termed—the C. of albumen by heat, as in the case of the boiling of an egg, and of caseine by rennet in the manufacture of cheese, are familiar examples of this phenomenon.

Coagulation of the Blood.—The change which occurs in blood usually after removing it from the body by which it separates into a solid and fluid portion. See BLOOD.

Coa'ita, or Qua'ta (*Ateles paniscus*), a species of Platyrhine, S. American monkeys, belonging to the genus *Ateles* (q. v.), or spider-monkeys. The C. measures about a foot long in the body, the tail itself, which is very elongated, measuring 2 feet. The face is dark coloured. This monkey is not to be confounded with the *Coaiti* (q. v.), or Coaiti-Moudi, a carnivorous mammal.

Coai'ti (*Nasua*), a genus of Carnivorous mammalia, included in the family *Ursidæ* or Bears, and belonging solely to the New World, being found in Surinam and Brazil. In this genus the molar teeth are small, and the canines compressed and sharp. The muzzle is very elongated, proboscis-like, and extremely mobile. The claws are long, and of curved, compressed shape, and the tail is also of considerable length. The red C. (*N. rufa*), or C.-Moudi, has a fur of reddish-chestnut colour, the ears and legs being black, the tail banded with maroon colour, and the lower jaw white. It is fond of climbing trees. The brown C. (*N. Narica*), or *Narica*, has a brown-coloured fur, which is sometimes mottled with black, and tinted with chestnut. The under parts are coloured grey. The fur is thick and coarse. The C. feed on both animal and vegetable matters, and although shy, may yet be domesticated with success.

Coal (Old Eng. *col*, Dutch, *kool*, Fr. *koal*, Ger. *kohle*, a word found indeed in all the Teutonic languages, and having its congeners in Latin), is the name given to a substance which it is much easier to recognise than to define, and the question, What is C.? has at once baffled the law courts and scientific men to answer. Dr. Percy (*Fuel*) has thus attempted to distinguish it from all other bodies. 'C. is a solid, stratified, mineral, combustible substance, varying in colour from dark-brown to black, opaque, except in extremely thin slices, brittle, not fusible without decomposition, not sensibly soluble in ether, chloroform, benzole, or oil of turpentine, not containing sufficient earthy matter to render it incapable of being applied with advantage as a source of heat in ordinary fireplaces or in furnaces.' There is no doubt that C. is vegetable matter which has undergone great changes from the length of time it has been stored up within the earth, and the various influences to which it has there been subjected. A gradation in physical as well as chemical characteristics can be traced, leading from wood and peat at one extremity, up to anthracite, which is the ultimate product of these changes recognised as C. Liebig explains the chemical changes necessary to produce C. from wood or peat by the theory of the elimination of a compound of hydrogen and carbon as marsh gas, of carbon and oxygen as carbonic acid, and of hydrogen and oxygen in the form of water. As regards physical characteristics, certain varieties of peat are hard, black, and lustrous like C., and some lignites or brown coals retain so much woody appearance and structure that boxes have actually been made from them.

The varieties of C. are usually classified as—(1) Anthracite, (2) Bituminous C., and, (3) Lignite or brown C.; but it is not possible to strictly limit any class, and each contains within itself many minor variations. Anthracite or stone-C. is usually of a brilliant black lustre; it has a conchoidal fracture, and it does not soil the fingers on handling. It is often called Blind C., on account of the difficulty with which it is ignited and burns. It includes such coals as contain the highest proportion of carbon, its range being from 90 to 95 per cent. Enormous deposits of anthracite exist in the eastern division of the great Pennsylvanian C.-field in the U.S. Bituminous C. includes the greater proportion of C. in common use, and nearly all the deposits in British C.-fields come under this head. It contains generally from about 73 to 90 per cent. of carbon, leaving out of account the ash or earthy matter always present in variable proportions. Several varieties of bituminous C. are distinguished according to their mode of burning, which depends chiefly on the relative proportions of carbon, oxygen, and hydrogen they contain. Steam-C. approaches anthracite in its properties; dry or non-caking C. does not possess the valuable property of agglutinating during burning which characterises caking or household C. and makes it so valuable for domestic use. Cannel or parrot C. differs considerably in appearance from ordinary bituminous C., being of a dull, lustreless, black colour, not splitting into thin layers, and generally devoid of vegetable structure under the microscope. Cannel-C. contains a comparatively large percentage of oxygen and hydrogen, and it is therefore of value for the manufacture of C.-gas or paraffin oil. It is only distinguished from the bituminous shales now extensively used for paraffin and gas by the much larger proportion of ash which the latter contain. Lignite or brown C. is a name generally restricted to such deposits as are of more recent origin than the carboniferous epoch to which the great C.-fields at present worked belong. Lignites vary in colour from a light earthy brown to a deep lustrous black, which last is undistinguishable from ordinary bituminous C., and they contain from 50 to 70 per cent. of carbon, leaving out of account the ash they contain. They also usually have a large percentage of water. Deposits of lignite of great industrial value occur in Germany, and some of them yield on distillation a very large proportion of paraffin. Taking 100 parts of carbon as a standard of comparison, the following may be regarded as showing the average composition of these leading varieties of C.:—

	Carbon.	Hydrogen.	Oxygen.
Anthracite . .	100	2·84	1·74
Bituminous C.	100	6·21	21·23
Lignite . . .	100	8·37	42·42

Although the greater proportion of the C. in Europe and America belongs to the deposits of what is known as the carboniferous epoch, it must not be concluded that C. is on that account a product peculiar to that period. In Great Britain workable seams of C. are found in oolitic deposits at Brora in Sutherlandshire, and C. of a similar age is also found in Yorkshire,

while at Bovey Tracey, in Devonshire, a lignite has been worked which belongs to a period so comparatively recent as the Miocene age. The brown C. deposits of N. Germany are not older than the Wealden of England, and the enormous C.-fields of India and China are supposed to have been formed during the Permian epoch.

C.-fields are very widely and generally distributed throughout the world, and the total quantity of C. known to exist within available depths is at present great beyond compute. France contains numerous small patches of carboniferous deposits, and in the N. has one considerable field in the Departments du Nord and Pas de Calais, conterminous with the rich C.-field of Belgium. The Belgian C.-field covers an area of 326 sq. miles, and has about 120 seams of C. in progress of active working, the annual output from which reaches to about 12,000,000 tons. In Prussia, the Westphalian C.-field, although long known and worked, has only of recent years risen into great importance, its yield having risen from 2,000,000 tons in 1851 to 10,500,000 tons in 1867. It extends over a surface of 200 sq. miles, contains more than sixty workable seams of C., and is estimated to possess about 40,000,000,000 tons of available C. Prussia also contains the greater portion of the Saarbrucken field, which has an area of nearly one thousand miles. It contains seventy-seven seams of more than 2 feet in thickness, measuring in all 240 feet of workable C., and it is calculated to contain 2,750,000,000 of tons within reach of human art. The C.-field of Silesia also, of which the limits have not been accurately defined, is known to contain 333 feet of C. in seams of not less than 2½ feet thick, and it is estimated to contain an attainable supply of at least 50,000,000,000 of tons. C. also is worked largely in Saxony, and Austria likewise possesses extensive deposits of both true C. and lignite. It is known that Spain and Russia both contain extensive C.-fields almost entirely unopened. The C.-fields of N. America cover an enormous area, and are rich in workable seams of excellent C. In the British provinces it is estimated that there are 8000 sq. miles of C.-bearing area, some of the seams being of great thickness—one at Pictou in Nova Scotia measuring no less than 37½ feet across. The C. deposits of the U.S. extend over an area of no less than 200,000 sq. miles, divided into five separate fields. The Appalachian field is computed as equal to 65,000 sq. miles; the Illinois and Indiana field has 51,000 sq. miles; Iowa, Missouri, and Arkansas are together credited with 73,000 sq. miles; Texas has 3000, and the Michigan field is estimated at from 12,000 to 15,000 sq. miles. These enormous deposits are scarcely even yet broken into, the entire produce of the States for 1873 being stated at 28,343,964 tons, of which no less than 22,828,178 tons were anthracitic. Professor Oldham reckons the C.-fields of India to contain 16,000,000,000 of tons. In recent years it has been made known by the investigations of Baron von Richthofen, that the C.-fields of China extend over an area of 400,000 sq. miles, and it is understood that the opening up of these vast treasures is about to be undertaken by the Chinese Government.

The extraordinary rapidity with which the annual output of C. from British mines has increased in recent times, led a few years ago to a species of panic regarding the possible early exhaustion of our mineral wealth, and in consequence a Royal Commission was appointed to 'inquire into the several matters relating to C. in the United Kingdom.' As a result of the labours of that commission, we have the most accurate and reliable statistics attainable regarding the limits of the various British fields, their available contents, and the rate at which they are being worked out. The following table exhibits the progressive increase of the demand upon our C.-fields since reliable statistics were first collected, it being estimated that the consumption, at the beginning of the century, was about 10,000,000 tons:—

1855, 64,453,070	1865, 98,150,587	1873, 127,016,747
1860, 80,042,698	1870, 110,431,192	1874, 126,590,108

The whole available C. in ascertained C.-fields, according to the report of the commissioners in 1871, including only such as exists within 4000 feet of the surface, and seams of not less than one foot in thickness, amounts to 90,207 millions of tons. To this amount they add as existing under Permian and recent rocks, but still within the 4000 feet limit, 56,273 millions of tons as the probable contents of fields yet unexplored, making an aggregate attainable amount of C. of 146,480 millions of tons. Lying at a depth ranging from 4000 to 10,000 feet, in all the fields included in the above estimate, it is calculated there is an additional quantity of more than 48,465 millions of tons. But as the internal temperature of the earth increases at the rate of 1° Fahr. for each 60 feet downwards from the surface, and as there is good reason to believe that it rises in much more rapid proportion as we penetrate inwards, it is not supposed to be possible, under any conditions at present known, to work at a depth of more than 4000 feet, while at the depth of 10,000 feet the heat must be much greater than that of boiling water, and the shaft of the pit reaching to that depth would be nearly 2 miles long. The total available deposit of workable C. is, therefore, for the present 146,486 millions of tons, and of that amount Scotland possesses 9843 millions of tons, of which 1800 millions lie under the Firth of Forth. Ireland possesses only the insignificant total of 140 millions of tons, little more than the output of the United Kingdom for one year. In judging of the possible exhaustion of British C.-fields, three methods of viewing the subject may be adopted. Judged by the annual output at which we have now arrived, it is easy to say we have C. which will furnish our present rate of supply for somewhat more than one thousand years. Taking the alarmist view of the rapid development of C.-mining during the past quarter of a century, and supposing the demand to continue progressive in the same ratio, we must, according to Mr Price Williams and others, exhaust our C.-fields in 360 years. Neither of these views take into account the conditions under which the demand for C. has increased so rapidly, nor the probable future of the industry. 'On the one hand,' say the commissioners, 'the rate of consumption may be thrown back to any extent by adverse causes affecting our national prosperity, and on the other hand, new discoveries and developments in new directions may arise to produce a contrary effect upon the consumption of C.' They also point out that long before the period of total exhaustion a time of scarcity and dearness would first be reached; that naturally the best and most accessible seams are first exhausted, leaving only such as are more difficult to win, and of less value. Gradually thus we would lose the easy industrial supremacy we now possess through C., and instead of exporting, as we do at present, it would become cheaper to import C. from America or other fields than to work out the remnants of our own. Other considerations might be adduced pointing towards the improbability of the consumption of British C. continuing to increase at the rate of recent experience. Continental and American fields are being rapidly opened up, and worked more in proportion to their size than hitherto; improved scientific processes and machinery are yearly extracting much larger proportions of calorific effect from C. than heretofore, and there is much less waste in the mining processes. The introduction of improved processes in metallurgy, such as the hot blast and the Bessemer process, has already been the means of effecting enormous economies, and in almost all directions involving the burning of C., great room for other like improvements yet exists.

The industrial applications of C. do not end with its great value as a calorific agent. Distilled at a low temperature, it yields paraffin and paraffin oils used for illuminating and lubricating, and by applying a higher temperature, C.-gas is produced. The residual gas-tar and liquor of these processes are also of great value, being the sources of ammoniacal salts in the case of the liquor, while the tar yields aniline, whence the C.-tar dyes are produced, the disinfectant carbolic acid, pitch for artificial asphalt and other useful products.

For mining of C. and the regulations of C.-mines, &c., see under MINING.

Coal'brook Dale, a valley and hamlet in Shropshire, on the Severn, which is here crossed by a cast-iron bridge of more than 100 feet span, and 40 feet high. The dale has a valuable coal-field, the group of strata enclosing the beds having a thickness of from 700 to 800 feet, and also extensive ironworks. The inhabitants are mainly employed in the foundries and collieries.

Coal'fish (*Merlangus carbonarius*), a Teleostean fish included in the *Gadidæ* or Cod family, the fry or young of which are known as *Podleys*, whilst the adult form is also known by the name of *Saithe*. The length varies from 10 inches to 1 or 1½ feet; the upper parts are of a deep bluish-black colour; in shape and form it resembles the Whiting (q. v.) very closely. The flesh is coarse, but is eaten salted in the northern parts and

islands of Scotland. The C. occurs also on the American coasts and in the N. seas. It is voracious in habits, swallowing many kinds of bait.

Coalition is a term applied in English politics to the union of two parties or portions of parties for the attainment of a common end. The most noted C. in British history is that of 1782, when Lord North and Charles James Fox, the leaders of opposing parties, took office in the same cabinet. More recently (1853) the C. of the Whigs and Peelites in the Aberdeen cabinet is memorable in connection with the Crimean war. If Mr Disraeli is to be believed, 'England does not love coalitions'—perhaps because they have never been successful, and rarely honest.

Coal-Mines, Law as to. A coal-mine is legally part of the lands within which it is situated; but it may form a separate estate. A proprietor may sell the surface of land, reserving the coal and other minerals, or he may sell the latter and reserve the former.

Coal-Mines Regulation Acts were passed in 1872 for the purpose of consolidating and amending the Acts relating to mines. Under the Act, no boy under ten years old, and no woman or girl of any age, is to be employed in any mine to which the Act applies below ground. The Act makes regulations regarding hours of labour and meals. It also deals with the education of boys employed underground. Wages are not to be paid at public-houses. Single shafts are prohibited. A daily inspection by a competent person of every mine is directed, and a great number of regulations are made with the view of promoting healthfulness and safety in the coal-mines. See METALLIFEROUS MINES REGULATION ACT.

Coal-Tar. See GAS-TAR.

Coam'ings of ships are frames of wood or iron placed round hatchways and other openings in the deck to keep out water.

Coan'za, Cuan'za, or **Quan'za,** after the Congo (q. v.) the most important river of Lower Guinea, Africa, rises in the plateau of the interior, and, after a course of 600 miles marked by numerous cataracts, enters the sea 38 miles S. of San Paulo de Loando. It forms several islands near its mouth, has numerous tributaries, and is navigable for large boats as far up as the lowest cataract, about 110 miles. See Valdez, *Six Years of Traveller's Life in Western Africa* (2 vols. Lond. 1861).

Coast-Guard, a body of seamen formerly employed by the customs department exclusively to keep a look-out for smugglers, but since 1856 under the control of the Admiralty, and liable to be called to serve as regular sailors on board ships of war. The force may be augmented to the number of 10,000 at the utmost. The coasts of the United Kingdom are divided into eleven districts, at each of which there is a district gunship, while there is also a headquarters ship. Able-bodied seamen employed in the service are divided into three classes—boatmen, commissioned boatmen, and chief-boatmen; they receive high sea-pay, free house, rent, and medical attendance, and 1s. 4d. a day besides in place of provisions. They are drilled in the serving of land-batteries, gunboat exercise, and naval gunnery. The number of the C.-G. on shore, officers and men, provided for in the naval estimates for 1874–75 was 4300; and the expense of the C.-G. service, royal naval coast volunteers, and royal naval reserve was £163,311.

Coast Volunteers, or **Royal Naval Coast Volunteers,** an attempt, which has not been very successful, to organise seafaring men and others, in connection with the Coast-Guard (q. v.), but separate from it, specially for the defence of the coasts of the United Kingdom. The Admiralty was empowered by an Act of Parliament passed in 1853 to raise such a body, not exceeding 10,000; to enrol them for five years' service; to have them exercised, on shipboard or on shore, twenty-eight days every year; but not to send them on duty beyond 50 leagues from the coast, unless at an emergency, when they might be sent 100 leagues. Their pay, allowance, and rank during active service is the same as that of able-bodied seamen. At present, 1875, the men enrolled in the C. V. do not number 1000.

Coast'ing Trade is the maritime commerce between ports of the same country. Formerly no goods or passengers could be lawfully carried coastwise from one port of the United Kingdom or Channel Islands to another except in British ships. This restriction on foreign vessels has been repealed by 17 Vict. c. 5, subject to the Customs Act, 1853, and the right of retaliation. See NAVIGATION LAWS.

Coatbridge', a town in the parish of Old Monkland, Lanarkshire, 8 miles E. of Glasgow, and a station on the Caledonian Railway. It stands in the centre of a district rich in minerals, and is near the great ironworks of Gartsherrie, Summerlee, Dundyvan, Calder, and Langloan. In the immediate neighbourhood are upwards of fifty smelting furnaces. C. is one of the most thriving towns in Scotland, the pop. having increased from 1599 in 1841, to 13,624 in 1871.

Coat of Arms, a garment worn in the knightly exercises and actual battles of the middle ages, embroidered with the armorial insignia of the wearer. It was made of velvet, fur, cloth of silver or of gold, and descended to the knee. The phrase is applied in modern heraldry to the insignia alone, on whatever field they are emblazoned. See HERALDRY, SHIELD.

Coat of Mail, a suit of armour made of plates or scales of metal, or of linked rings, which was worn in the middle ages.

Co'balt is a steel-grey metal, occurring in small quantities in the free state in Meteoric Iron (q. v.), in combination with arsenic as *tin-white C.* ($CoAs_2$), with arsenic and sulphur as *C. glance* ($CoSAs$), and with arsenic and oxygen as *C. bloom* ($3CoOAs_2O_5$); it is also present in many copper ores. Before the discovery by Scheurer, in 1540, of the beautiful blue colour which oxide of C. imparts to glass when fused with it, compounds of the metal possessed no value, and their presence in the mines was attributed by the superstitious German miners to a malevolent demon or *kobold*, who was supposed to have placed them there instead of the useful ores which they resemble in appearance; it is from this curious superstition that C. derives its name. Metallic C. was isolated by Brand in 1773. It may be obtained by strongly igniting oxalate of C. It is hard, very infusible, and magnetic, and in its chemical properties and compounds resembles iron. Its atomic weight is 59, and the symbol for its atom Co. Chloride of C. ($CoCl_2$) is a red salt, obtained by dissolving oxide of C. in hydrochloric acid; its solution is employed as a *Sympathetic Ink* (q. v); nitrate of C. $Co(NO_3)_2$ is prepared in a similar manner. C. has two oxides, the protoxide CoO, and the sesqui-oxide Co_2O_3; the latter is used for staining glass and porcelain, and is obtained as a black powder by precipitating chloride of C. by a solution of bleaching powder. When C. ores which have been previously roasted are fused with sand and pearl ash, the oxide of C. produced by roasting the ore dissolves in the glass formed by the pearl ash and sand, with a magnificent blue colour, whilst nickel, copper, iron, &c., also present in the ore, collect at the bottom of the vessel in which the fusion has been made in a metallic mass called *speiss*. The blue glass when finely levigated forms *smalt* or *C. ultramarine*, whilst from the speiss, nickel is extracted. *Zaffre* is an impure oxide of C., obtained by roasting C. ores with sand. *Thenard's blue* is prepared by igniting a mixture of freshly-precipitated alumina and carbonate of C., or of the phosphate of alumina and C. *Rinman's green* is obtained by evaporating a mixed solution of nitrate of C. and nitrate of zinc to dryness, and calcining the residue.

Coban', a town of Guatemala, Central America, on the Rio Dolce, 55 miles N. of Guatemala. It lies in a region rich in sugar-cane plantations and in tropical fruits. Pop. (mostly Indians) 14,000.

Cobbett, William, an English political writer, born 9th March 1762, at Farnham, in Surrey, was bred to work on his father's farm. In 1783 he enlisted in the 54th Foot and went to Nova Scotia; while there he taught himself constantly, and rose to the rank of sergeant-major. Discharged in 1791, C., after spending a few months in Paris, settled in Philadelphia as bookseller and pamphleteer. Here he wrote in the bitterest manner against free thought, free institutions, &c., and was twice fined for libel. His *nom de plume* was Peter Porcupine; latterly his publication became periodical, and was called the *Political Censor.* Returning to London in 1800, where he was received with considerable attention by public men of Pitt's party, he started first a daily paper called the *Porcupine*, and then the *Weekly Register.* His influence may be inferred from the fact that Windham stated in the House of Commons that C. deserved a statue of gold. By his discussion of the

treaty of Amiens he contributed to the rupture with France. In 1803 he suddenly went over to the Radical side of politics, either because he was slighted by Pitt or from conviction. This led to more than one Tory prosecution followed by fine and imprisonment. In 1817 his *Twopenny Tract* alarmed the Government into passing the 'Six Acts,' and C. retired for two years to America, where he studied agriculture, and drew certain conclusions on 'cottage and farm economy,' which, on his return to England, he tried unsuccessfully to realise on two farms. In 1825 appeared his *History of the Reformation in England and Ireland*, which, with his *Legacy to Parsons*, expresses his opinion that the transactions in Church property at the Reformation were fraudulent, and that the original Catholic endowments should be restored to educational and charitable objects. C. was now a popular leader on social and economic, as well as political, questions, as may be seen in his *Advice to Young Men and Women*, *Poor Man's Friend*, *Rural Rides*, *Emigrant's Guide*. As the Reform Bill drew near, the political interest became predominant. C. was once more prosecuted for some intemperate language, in which, in the *Register*, he had defended the burning of threshing-machines by the distressed labourers (Luddites) as leading to the reduction of tithes. Returned to the House of Commons for Oldham in 1832, he sat there for three years. He died at his farm of Ash, near Farnham, 18th June 1835. The rugged independence and energy of C.'s character were somewhat marred by an inordinate vanity, which led him to regard himself as one of the leading men in Europe of his time, and by the superficial knowledge of social and political institutions, which is so often the bane of self-educated men. He is acknowledged to be a master of plain, forcible prose; and the warmth of his public and private affections and his substantial honesty have not been seriously questioned. C. is seen at his worst in his conceited *History of George IV*. See an admirable essay by Professor Thorold Rogers. His son, **John Morgan C.**, published a complete collection of his *Political Works* (2d ed. 9 vols. Lond. 1848).

Cobden, Richard, an English politician, born at Dunford, near Midhurst, 3d June 1804, was the son of a small gentleman farmer. In 1838 he abandoned his career as a calico-printer in Manchester (which had been rapidly successful) that he might devote himself and his fortune to the Anti-Corn Law agitation. He seconded Mr J. B. Smith's celebrated motion before the Manchester Chamber of Commerce, and for nearly six years attended the Inner Council of the League, which met twice a day at Newall's Buildings, Market Street, Manchester. It was C. who gained over many of the Chartists and the clergy, and who founded the Anti-Corn-Law Conference, which sat in the Palace Yard to watch the Free-trade motions in Parliament. At Drury Lane and Covent Garden, and at the great centres of Protectionism through the country, C. and Bright, during the memorable year of 1843, seemed to carry everything before them, until the *Times* itself declared (18th November) that the 'League was a great fact.' In the meantime C. had been, in August 1841, returned to Parliament for Stockport, and took part in the debates on Mr C. Villier's annual motion, 'that all duties payable on the importation of corn, grain, meal, and flour do now cease.' In 1844 he brought forward his motion for a select committee to inquire into the effects of protective duties on imports in the interest of the tenant farmers and farm labourers of the country. He was replied to by Mr Gladstone. After the triumph of his principles in 1846 (a triumph which Sir R. Peel stated in Parliament to be mainly due to C.'s efforts), he was returned unopposed for the W. Riding of York, which he represented till 1857, when he was rejected by his constituency for having offered what was considered at the time a factious opposition to Lord Palmerston. In 1859 C. was chosen by Rochdale. In 1860 he carried through the Commercial Treaty with France, was offered a baronetcy and a seat in the Privy Council, but declined these honours; soon after fell into bad health, and withdrew from political life. He died 2d April 1865. C. was an ardent advocate of free trade in land, viz., the abolition of primogeniture, strict settlements, &c.; of financial reform, in which he included the substitution of direct for indirect taxation, and the consequent throwing open of all ports; of reduction in the votes for the services, as involved in his principle of non-intervention; of national, in the sense of undenominational, education. He spoke against the confiscation of the unarmed vessels belonging to subjects of a hostile belligerent, and against the practice of public loans being negotiated without inquiry for purposes of tyranny and oppression. Although there was no rhetorical art or epigram in C.'s speeches, they were marked by unaffected grace and simplicity, by keen logic, and by an abundance of well-chosen and accurately-stated facts. His *Political Writings* were published in 2 vols. (Lond. 1867).

Cobi'ja, or **Puerta la Mar**, the only seaport of Bolivia, and capital of the province of Atacama, 300 miles N. of Copiapo, has an insignificant trade. Pop. 2380.

Cobi'tis. See LOACH.

Cob'le, or **Cobb'le**, a low, flat boat, with the stern square. It is much used by salmon-fishers.

Coblenz', or **Koblenz'** (the Roman *Confluentes*), the capital of Rhenish Prussia, situated on the Rhine, at its confluence with the Moselle, is a fortified city of the first rank. It is connected, for purposes of defence, with the strongly fortified castle of Ehrenbreitstein (q. v.), on the opposite bank of the Rhine. The old town is irregularly built, with many of its streets narrow and ill-kept, but the new town is well built, and its streets airy and clean. The church of St Castor, founded early in the 9th c., stands on a tongue of land jutting out between the Rhine and the Moselle; other public buildings are the Government-house, the town-hall, the king's palace, and the old castle of the Electors of Treves. There are manufactures of linen, cotton, furniture, and japanware. Vine culture engages the industry of many of the inhabitants. C. is a free port, and carries on an extensive commerce, especially in corn, wine, and iron; it has also a trade in volcanic products for millstones and mineral waters. Pop. (1872) 28,748. There were also in garrison 2169 soldiers, and in the castle of Ehrenbreitstein 2488.

Cob-Nut, a large cultivated variety of the Hazel (q. v.). The Jamaica C., or Hog-nut, is *Omphaba triandra*, a tree of the natural order *Euphorbiaceæ*. Its white juice, which turns black in drying, is used in Guiana and other countries as ink. The nut is wholesome if the embryo is extracted; otherwise it is cathartic.

Cob'ra (*Naja*), a genus of Colubrine snakes belonging to the section *Venenosa*, and included in the family *Elapidæ*. The distinguishing features of the genus *Naja* are the possession of one or two smooth teeth behind the poison fangs, and the power of distending the loose skin at the sides of the neck, so as to form a kind of movable hood. The Portuguese name of the C. (*C. da capello*) means 'hooded snake.' This snake, the *Naja tripudians* of the naturalist, is one of the most deadly and venomous of known serpents. It inhabits India, and receives the name of 'spectacle snake' from the spectacle-like mark which exists on the back of the neck—a mark wanting in the nearly-allied *Naja Haje* of Egypt. The C. attains a length of 3 or 4 feet, and is coloured of a pale brown on the upper parts, and a lighter tint below; whilst the colour is variously marked with black, and exhibits variations. Specimens destitute of the spectacle-mark come from the E. Indies. The poison proves fatal to man within a comparatively short period.

Co'burg, or **Koburg**, capital of the Duchy of Saxe-Coburg, Germany, and alternating with Gotha as the residence of the Grand Duke of Saxe-Coburg-Gotha, is situated on the left bank of the Itz. The town is mostly old, and not well-built. Of its six churches, the most notable is the *Moritzkirche*, with a tower nearly 340 feet high. The old castle of the Dukes of C., in which Luther was concealed in 1530, stands on a height 500 feet above the town. The ducal palace was erected in 1549, and is the principal building. C. has manufactures of cotton, linen, and woollen fabrics, artistic work in marquetry, gold, and silver, also bleaching and dye works, breweries, &c. Pop. (1872) 12,891. Near C. are the 'pleasure-castles' of Rosenau and Kallenberg.

Coburg Peninsula, in the N. of Australia, forms the N.W. extremity of Arnhem Land, to the W. of the Gulf of Carpentaria, and partly encloses Van Diemen Gulf. It is an irregular promontory, about 50 miles from E. to W., but slightly connected with the mainland, and separated from Melville Island by the narrow channel of Dundas Strait.

Co'ca, or **Cu'ca** (*Erythroxylon C.*), a shrub of the natural order *Erythroxylaceæ*, the leaves of which are extensively chewed

by miners and travellers in Peru, mixed with a little unslaked lime or the ashes of the Quinoa (q. v.) or of the trumpet-tree (*Cecropia peltata*). They have an effect on the constitution analogous to that of wine, enabling those using them to bear up under great fatigue and hünger. Respiration, so difficult at high altitudes, no longer becomes a labour; the desire for sleep departs, and the spirits attain buoyancy unknown before. Taken habitually and in large quantities, C. occasions various biliary and stomachic disorders, and eventually ruins mind and body. Used to a great extent with tobacco, it produces a sort of intoxication. Such, at least, is the account given by the native Indians who have long been acquainted with its use, and by Spruce, Tschudi, Scherzer, and other travellers. Weddell does not, however, think so highly of it, affirming that it does not supply the place of food, but merely deadens the sense of hunger for a time. Its use is now rapidly spreading, not only among the Indians, but among the Europeans and other settlers in Peru. Some years ago it was calculated that 30,000,000 lbs. were annually gathered, and that the use of the drug was indulged in by 10,000,000 people. In Bolivia alone about 15,000,000 lbs. are produced annually. It is probable that C. owes its peculiar properties to an organic base, to which Weddell has applied the name of *cocaine*, which in many of its properties resembles *theine*. A tonic wine has been made from it, and this, as well as the leaves, may probably yet be used as a medicinal agent.

Cocce'ji, Heinrich, Freiherr von, a very able and learned jurist, was born at Bremen, 25th March 1644, went to Leyden to study law in 1667, and to England in 1670. Having acquired a profound acquaintance with the subject in all its branches, he was appointed Professor of the Law of Nations at Heidelberg in 1672, of Jurisprudence at Utrecht in 1688, and regular Professor of Law at Frankfurt on the Oder in 1690. C. was sent on a mission to the Hague by Friedrich I. in 1712, and after his return was created a baron of the empire and a privy councillor. He died 18th August 1719. His chief work is his *Juris Publici Prudentia* (Frankf. 1695), which was long used as a text-book in German universities. Other productions of C. are *Anatomia Juris Gentium* (Frankf. 1718), and *Grotius illustratus* (3 vols. Bresl. 1744–48).—His son **Samuel**, born 1679, succeeded him as professor (1703), but devoting himself to a public career, rose to the highest legal position, dying (22d October 1755) High Chancellor of the Prussian state. He was the great reformer of the administration of justice in Prussia. His great professional work is the *Corpus Juris Fridericianum* (Berl. 1749–52). Other of his writings are *Jus Civile Controversum*, and *Novum Systema Jurisprudentiæ Naturalis et Romanæ*.

Cocce'jus, Johann, whose original name was Koch, born at Bremen, 9th August 1603, was first appointed Professor of Hebrew at Bremen (1629), then at Franeker (1636), afterwards Professor of Theology in the same place (1643), and finally Professor of Theology at Leyden (1650), where he died, 5th November 1669. He established a peculiar theological system called the *federal* method, founded on the idea of a covenant between God and man, which again was twofold—the covenant before the fall (of works), and the covenant after the fall (of grace); the latter embracing a threefold economy—prior to the law, under the law, and of the gospel; and also a school of biblical interpretation, according to which the Old Testament history exhibited, as in a mirror, the history of Christ and of the Christian Church, and which carried on a great controversy in the Netherlands during the 17th c. with the opposite school of Grotius (q. v.). His collected works were published at Amsterdam in 8 vols. (1673–75, and again in 10 vols. 1701), to which was added his *Opera Anecdota* in 2 vols. (1706). See Conybeare's *Bampton Lectures* (1824).

Coccinel'la. See LADYBIRD.

Coccin'ia, a climbing cucurbitaceous shrub, common in the hedges in India, the ripe fruits of which are used by the natives in their curries, and the leaves and other portions are also used medicinally.

Coco'o, Co'coa Root, or Eddoes, a name applied to various species of *Colocasia* and *Caladium*, tropical and sub-tropical, closely allied genera of plants belonging to the natural order *Araceæ*, the underground root, or Corms (q. v.), of which are used as food, *e.g.*, *C. antiquorum*, *C. esculenta*, *C. macrorhiza* (the Taro of the South Sea Islands—q. v.), *C. Himalensis*—the root of which, in addition to its nutritive properties, is, when fresh, stimulant, diaphoretic, and expectorant. The leaves of *C. antiquorum* when raw are acrid, but by boiling they lose their acridity, and are eaten as a substitute for spinach. The corms of *C. esculenta* are sometimes called Yams (q. v.) in the W. Indies, Madeira, &c. Lecoq has described curious spasmodic movements in its leaves, occurring spontaneously, at irregular intervals, and at different periods of the day and night. The quivering was sometimes of sufficient force to ring little bells attached to the leaves. M. Lecoq states that *C. esculenta* is quite destitute of Stomata (q. v.), and he attributes the phenomenon to the incessant pulsation of the imprisoned sap.

Coccoloba. See SEASIDE GRAPE.

Coccosteus (Gr. 'berry-boned'), a genus of extinct *Ganoid* fishes, included in the sub-order *Ostracostei*, and having the head defended by a large ganoid shield, the plates of which were covered with small tubercles; the presence of these latter giving origin to the name 'berry-bone.' A ventral or sternal shield also existed, but this latter had probably no connection with the upper one. A lower jaw or mandible existed, and this carried teeth of small size. The Notochord (q. v.) was persistent, but the neural spines of the vertebræ, their hæmal spines, and the fin-rays were ossified. This genus of fishes is exclusively confined in Britain to the Devonian rocks. Barrande has, however, described one from the Silurian rocks of Bohemia.

Cocc'ulus, a genus of plants of the natural order *Menispermaceæ*. A decoction of the roots of *C. villosus*, an Indian species, is used in cases of rheumatism, &c., and the fruits supply a kind of vegetable ink.

Cocculus Indicus, the fruit of the Anamirta Cocculus, a plant belonging to the natural order *Menispermaceæ*, a native of the E. Indies. The pericarp contains an alkaloid (*Menispermint*) which is not poisonous. The seeds are very poisonous, of the size of a large pea, and are very bitter. They owe their poisonous and bitter properties to Picrotoxin, $C_5H_6O_2$, a white, intensely bitter substance, crystallising in needles. C. I. has been used to give bitterness to beer, porter, and ale, but it is forbidden by law under very heavy penalties. It is sometimes used to destroy lice. In some countries it is employed to stupify fish, so as to render them easily caught.

Cocc'us, a genus of *Hemipterous* insects, belonging to the sub-order Hemoptera, and forming the type of a tribe named *Coccina*. From members of this genus the Cochineal (q. v.) and Kermes dyes are obtained. Many species infest our hothouses under the general name of bugs, and do harm to our plants; but it is to the tropical members of the group that we owe our dyes and other commercial products—such as lac, wax, &c. They are all minute insects, the males being two-winged, and the females wingless, but possessing a rostrum or beaked process. The females infest plants, and suck nutriment from them by means of the rostrum. The abdomens of the males are usually provided with two elongated filaments. The *C. aceris* is a well-known British species. *C. cacti*, living in the Nopal or *Cactus opuntia* of Central America, furnishes Mexican cochineal. *C. lacca*, of the E. Indies, gives us lac. The females alone appear to yield the colouring matter. See COCHINEAL INSECT.

Coc'cyx is the inferior or posterior terminal portion of the vertebral column. In man it consists commonly of four rudimentary vertebræ, sometimes of five, rarely of three. These unite together, and in advanced life the C. unites with the sacrum. See SKELETON and VERTEBRAL COLUMN.

Coccy'zus. See CUCKOO.

Cochabam'ba, the second largest city of Bolivia, and capital of a department of the same name, on the Rio de la Rocha, is the see of a bishop, and has fifteen churches, manufactures of cottons, woollens, leather, saddles, starch, soap, &c., and an active trade in grain and fruits. Pop. 40,678. C. was founded in 1572, and played a conspicuous part in the Revolution of 1815.—The *department of C.* is rich in precious metals, and grows cotton, sugar, dyewoods, &c. Area 26,481 sq. miles; pop. (1865) 349,892.

Co'chin (*kochi*, 'a morass'), one of the most prosperous principalities of India, in the province of Madras, is bounded

N. by British Malabar, S. by Travancore, W. by Indian Ocean, and E. by the Ghauts. Area, 1131 sq. miles; pop. (1872) 399,060. It is divided into (1) an eastern hill region, clad with splendid forests of red cedar, teak, and other hard woods; (2) a tract of plain between these hills and a lagune or backwater, which extends along the entire coast, and (3) a strip of land between this backwater and the sea, covered with cocoa-nut trees. The rich damp plains yield rice, pepper, cardamons, ginger, betel-nuts, yams, arrowroot, sweet potatoes, &c., while the plantations on the Nelianipathy Hills produce excellent coffee. The revenue is £125,458, being £14,664 in excess of expenditure; there are state schools, which educate up to the university entrance examinations; roads and bridges are made and maintained, and the present Rajah (Rava Virmah) has established a system of forest conservancy. C. is inhabited by a Malayan-speaking people, and of its places of worship 2734 are Hindu, 31 Mohammedan, 8 Jewish, and 108 Christian. It is specially interesting as belonging to the portion of India first visited by European adventurers. The state was under the yoke of Hyder Ali and his son from 1776 to 1791, and the first treaty of the Rajah with the English was in 1793, when he agreed to pay a tribute of £20,000 a year, and received a guarantee of all his rights.

Cochin, a seaport in the district of Malabar, province of Madras, British India, and formerly capital of the native state of the same name, is situated at the N. point of the narrow peninsula separating the long coast stretch of backwater from the sea, and has some trade in cocoa-nut oil and fibre, pepper, coffee, &c., and a considerable industry in shipbuilding. Its fine harbour is injured by a bar, over which there is a depth of some 18 feet of water. The water is brought from a place 18 miles off, and the mean temperature is 78° F. Pop. 20,000, comprising, besides Hindus, Arabs, Dutch, Persians, &c. C. was the site of the first Portuguese fort in India, erected in 1503. It was taken by the Dutch in 1663, and by the British in 1796.

Co'chin-Chi'na, the Anamese' Empire, occupies a long and narrow strip of territory on the E. coast of the Indo-Chinese Peninsula, and consists of the inland province of Anam, and the maritime provinces of Tonquin in the N. and C.-C. in the S. It is bounded on the N. by China, on the E. and S. by the Gulf of Tonquin, the China Sea, and Lower or French C.-C., and on the W. by Siam. Area, 83,190 sq. miles; pop. stated at 9,000,000. A mountain range runs N. and S., separating the inland from the two maritime provinces. Spurs from this central chain occupy much of the area of Anam and C.-C., and numerous streams descending from it flow E. through the latter into the China Sea. Anam is watered by the Mekong. The province of Tonquin is flat, and is watered by the great and valuable river Song-koi, which, rising among the mountains of Yunnan, passes through rich alluvial plains in its lower course, and falls into the Gulf of Tonquin. The inhabitants are Mongols, Chinese, and Malays, engaged chiefly in the cultivation of rice, which is the principal article of food, and in working the tin and other valuable mines. The religion is Buddhism, the form of government is modelled upon that of China, and the capital is Hüe, on a river of the same name in the province of C.-C.

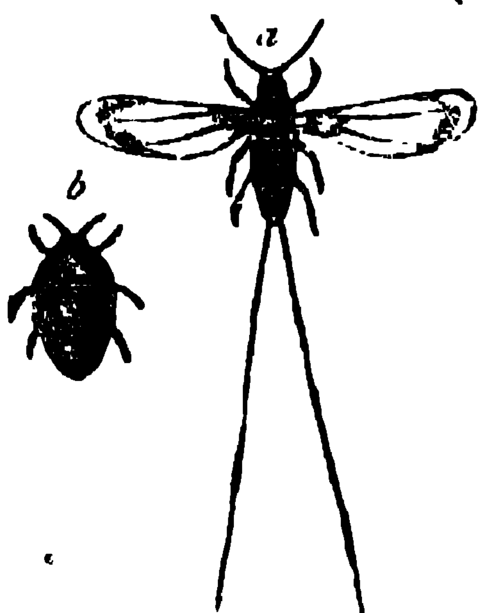
History.—The early history of Anam, by which name the empire is always spoken of by the natives, has been said to be 'either a wild fable or a revolting recital of internal war, anarchy, and bloodshed.' Little is known about it with certainty until 1624, when the Christian religion was introduced into the country by Portuguese Jesuits from Macao. In 1778 Warren Hastings, Governor-General of India, despatched a mission to Anam with the view of establishing commercial relations with the empire. A frightful civil war was then raging throughout the country. The envoy was inhospitably received, and was at last counselled to take refuge on his ship in the harbour of Hué, whence with difficulty he escaped with his life. A few years afterwards the French attempted with greater success to establish relations with Anam. A Franciscan friar, usually designated Bishop of Adrian, but whose real name was Pigneaux de Behaine, and who was of French birth, while prosecuting a Christian mission in the country, became intimate with the reigning sovereign, had an opportunity of affording him signal services which led to the extension of his sovereignty in Tonquin and Cambodja, and thus obtained an ascendancy over his mind. The result was the ratification of an offensive and defensive alliance between the Anamese sovereign and Louis XVI. of France in 1787, or immediately thereafter. This treaty, however, led to no results materially beneficial to France. In the present century France has been more successful. See C.-C., Lower or French.

Cochin-China, Lower or French (*Basse Cochin-Chine*), a French colony in the extreme S. of the Indo-Chinese Peninsula, consisting of tracts of land on both sides of the lower course of the Mekong or Cambodja, bounded on the N.E. by C.-C., on the N.W. by the kingdom of Cambodja, and on the S. by the China Sea. Area, 21,716 sq. miles; pop. (1871) 1,335,842, chiefly Anamites and Cambodjans, but embracing over 20,000 Chinese engaged in commercial pursuits, and about 600 European civilians. The colony consists of the six provinces of Saigon, Mytho, Bienhoa, Vinhlong, Hattien, and Angiang. In the extreme N. and N.E. (the province of Bienhoa), the land is covered by spurs of the mountain range that runs S. through the Anamese empire, and by elevated uplands. This hilly district is productive in indigo, tobacco, cotton, sesamum, hemp, vegetables, earth-nuts, sugar-cane, betel, maize, mulberry-trees, &c. Forests of valuable timber trees also occur. In the other provinces of the colony the surface is flat, the soil alluvial and rich, and covered by an intricate and widely extended network of rivers and *arroyos*, or channels scooped out partly by nature and partly by human labour. The chief river is the Mekong or Cambodja, 'which,' says Louis de Carné, 'will bear comparison with the noblest rivers of Asia.' It divides itself into three great branches in its passage through the inland districts, and these are again subdivided into many minor branches, forming a delta 40 miles wide by 60 miles. Other important streams are the Donnai and the river of Saigon. All the greater rivers are navigable for vessels of considerable draught, though the sandbars at their entrances, over which the water is seldom more than from 9 to 12 feet deep, are an obstacle to navigation. A vast tract of the area of the colony is in rice-fields, and rice is the chief product of the country. In 1873 the amount of rice exported from C.-C. was 272,000 tons, or over 50,000 tons more than in the previous year. In 1874 the export of rice was 182,120 tons, and other exports were cotton, silk, sugar, pepper, coffee, and fish. The only great seaport, and the centre of commerce of the colony, is Saigon (q. v.). The climate is not considered healthy for Europeans. The rainy season, that of the S.W. monsoons, lasts from May to October, during which the temperature ranges from 68° to 86° Fahr. The hottest weather occurs in the months of February and March. The administration of government is in the hands of a governor and council.

History.—The connection between France and the Cochin-Chinese empire dates from the latter part of the 18th c., when, in 1787, the King of Anam, in return for services performed, engaged himself by treaty to cede the town and harbour of Touran or Kwang-han, with the territory belonging to it, to Louis XVI. The King failed to implement his treaty by the stipulated transfer of territory, but he yielded so far as to treat the French representatives with respect, and he extended protection to the French missionaries. In the succeeding reign the Christians suffered severe persecution at the instigation of the King, and many of the French missionaries were murdered. Under Tien-tri, who ascended the throne in 1841, the persecutions of the Christians were recommenced, until, in 1847, Captain Rigault di Genouilly arrived on the shores with a demand for the fulfilment of the treaty of 1787. His demand being refused, he fired into and destroyed five Cochin-Chinese junks. The relations of the two powers remained, however, unaltered—the Anamese persecuting, the French protesting—till 1857, when the Anamese Emperor, Tu-duc, fiercely assailed the Christians, and, among others, murdered a Spanish prelate. An alliance of France and Spain against Tu-duc was the result, and on the 30th August 1858 a squadron of French and Spanish ships appeared before Touran, summoned the forts to surrender within a given time, and receiving no answer, fired and took possession of the town and forts on the following day. The town and surrounding territory of Saigon was taken by the French in 1859, Mytho and Bienhoa in 1861, and Vinhlong in 1862. By treaty dated May 26, 1862, the King of Anam engaged to pay France an indemnity of 1,000,000 sterling, to cede to that power the three provinces then known as Lower C.-C., and to guarantee toleration in religion and commerce. Having acquired these three provinces, the first care of the French governor of the new colony was to secure the peace of the

frontiers. To attain this end was a matter of no small difficulty. The little kingdom of Cambodja, on the N.W. of the colony, had for years been ravaged by Siam on the W. and C.-C. or Anam on the E. It was evident to the French authorities that tranquillity was only to be secured by protecting Cambodja against her rapacious neighbours, and thus guaranteeing her independence. Accordingly, Rear-Admiral de la Grandière was despatched to the Viceroy of Cambodja (then under suzerainty to Siam), to inform that ruler that henceforth he was to consider himself a tributary to France, and a treaty giving validity to this arrangement was ratified between the two powers in August 1863. This arrangement naturally and not unexpectedly led to complications. The French felt themselves called upon to suppress an insurrection of a section of Cambodjans assisted by Anamites in 1867, and to prevent the recurrence of similar disturbances, the French governor wrested the three southern provinces of Lower C.-C.—Vinhlong, Hattien, and Angiang. Since this period the French have applied themselves to the object of developing their colony. In 1866 an expedition was organised to explore the course of the Mekong, and to open up a commercial highway by this river between the western provinces of China and the great seaports of the French colony. The river, obstructed by impracticable rapids, and with an irresistible current, was found to be quite unfit for navigation, and thus the dream of making Saigon the seaport of Yunnan and Szechuen vanished conclusively. But the resolution to extend French influence in Indo-China has not been abandoned, and in furtherance of this aim the minutes of a treaty with Anam were signed on the 14th March 1874, the chief conditions of which were—Opening three ports in Tonquin; liberty for Europeans to reside therein; liberty to travel in the interior under passport from French consul; leave to pass Chinese productions through Tonquin; freedom in regard to the Catholic (Roman) faith; obligation that French protection be called upon in case of internal disturbance. See *The Land of the White Elephant*, by Frank Vincent (1873); *Travels in Indo-China and the Chinese Empire*, by Louis de Carné, member of the commission of exploration of the Mekong (1872).

Coch'ineal Insect (*Coccus Cacti*), a species of the Hemipterous genus *Coccus* (q. v.), which lives on the *Cactus Opuntia* or Nopal of Central America, and on other species of cacti as well—such as the *Cactus* or *Opuntia Tuna* of Peru, &c. The C. I. was first introduced into Europe in 1523 from Mexico, but cochineal is now produced in the E. Indies and Algiers, as well as in Europe. This insect is of small size, and of a deep red or mulberry colour. The insects scraped from the cacti are killed by boiling water and dried in the sun. 70,000 of these small insects go to the pound of cochineal. In 1868, Britain imported 35,375 cwts. of cochineal, valued at £588,691.



Cochineal Insect.
(*a*, winged insect; *b*, wingless female.)

Coch'lea, a portion of the internal ear. See Ear.

Cochlea'ria. See Scurvy-Grass.

Cochlosper'mum, a genus of small trees and shrubs indigenous to tropical India, Africa, America, and N. Australia, belonging to the natural order *Flacourtiaceæ* (*Bixineæ*). The stem of *C. Gossypium* of India yields kuteera gum, used as a substitute for gum and tragacanth. The cottony substance which adheres to the seeds is used to stuff pillows, &c. A decoction of the roots is used in Brazil as a cure for abscesses, and for pains which are the result of falls and other accidents. *C. Planchoni* is a native of Western Africa; its roots yield a yellow dye. *C. tinctorium* of Senegambia also furnishes a yellow dye, as well as a medicine used in amenorrhœa.

Cock, a name applied generally to the males of Rasorial or Gallinaceous birds, but sometimes restricted to denote the male of the common or Domestic Fowl (q. v.). In the C.-birds of most Rasores (q. v.) the ornaments displayed in the form of plumes, brilliant lustres, wattles, and epidermal appendages are seen to greatest perfection. The presence of these appendages is doubtless a mark of sexual difference and selection. See Sexual Selection.

Cockade' (*cocarde*, Old Fr. *coquarde*, 'a cockscomb,' then a red device in the hat like a cockscomb), originally applied to the ribbon with which the loop of a cocked-hat was ornamented, is a term now used to signify a ribbon, a knot of ribbons, of leather, or something similar, worn on the hat as a badge of office or a party symbol. The badge of the Stuarts was a white rose, and a white C. became the symbol of their party after the Revolution, while that of Nassau was orange, and the Hanover C. black—the latter becoming common in this country after the accession of George I. It was in the 18th c. that these marks of distinction assumed military importance, a tuft of grass or corn being worn by the soldiers under Marlborough and Prince Eugene. In the War of Succession the French C. was white, that of Spain red; and the two colours were blended when the armies of these countries were subsequently combined. When in 1789 French citizens generally exhibited the 'red, white, and blue,' it was partly in defiance of an order issued in 1782, which forbade all who were not soldiers to wear the regulation white C. of France. The red and blue were added as being the colours of Paris. The tricolor has been the badge of the French army since the Restoration, at the beginning of which an ineffectual attempt was made to establish the white of the monarchy as the sole colour. The Austrian C. is black and yellow; the Prussian, black and white; the Belgian, black, yellow, and red—the shape on the Continent being generally a flat disc, and the material generally leather, but at times silk or other stuff. On the flat disc the colours are disposed concentrically. The adoption of the C. by European nations was only the systematising of ancient usage. The Plantagenet family was named after their sprig of broom—*Planta genista*; and the Wars of the Roses are so named after the badges of Lancaster and of York.

Cockatoo', the name by which several distinct genera of Scansorial birds, included in the family *Psittacidæ* or Parrots, are distinguished. The sub-family *Cacatuinæ* is sometimes formed to include these birds, in which—the true cockatoos—the tail is broad and even, and the head adorned with an erectile crest. The bill is larger and less acutely curved than in the parrots. These birds are confined to Australia and the E. Archipelago. The food consists of fruits and seeds, and the nests are built in holes of trees. They may learn to speak, but not with the same distinctness or fluency as the parrots. The great sulphur-crested C. (*C. galerita*), the lesser sulphur-crested C. (*Plyctolophus* or *C. sulphureus*), the galeated C. (*Callocephalon galeatum*), and the Banksian C. (*Calyptorhynchus Banksii*) of Australia are well-known forms. The genera *Microglossus* of New Guinea is also included in the C. family.

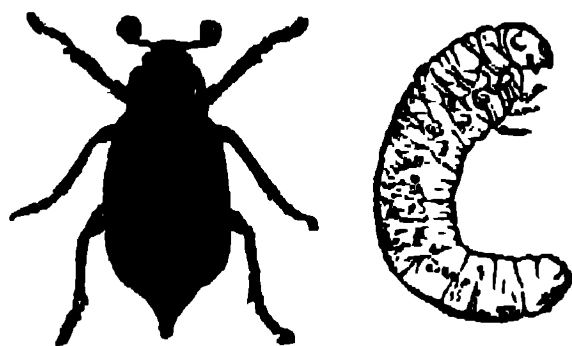

Cockatoo (black).

Cock'atrice, a fabulous monster, said to be hatched by a serpent from a cock's egg, and to inflict death by its breath and by its look. The word occurs four times in the authorised version of the Old Testament, where it evidently means a venomous serpent, and is probably identical with the reptile named by the Greeks *basiliskos*. See Basilisk.

Cockburn (pron. *Co'burn*), **Henry**, a notable Scottish advocate and judge, was born at Edinburgh, October 26, 1779, educated at the High School and University of his native city, and was called to the bar in 1800. After seven years' waiting for briefs, he was appointed Advocate-Depute to the then Tory Lord Advocate; but having, through his long and intimate friendship with some of the chief Liberals of the time, Horner, Brougham, and above all Jeffrey, thrown aside the political principles hereditary in his family, he was dismissed from the office. C.'s very considerable ability, his shrewd common-sense, and his impressive and homely manner, began to win him a reputation and a practice—particularly after the introduction into Scotland of jury trial in civil causes. In 1831, under the Grey Ministry, he was made Solicitor-General for Scotland, and in 1834 became one of the judges of

the Court of Session, when he took the title of Lord C. He died April 26, 1854, at his residence of Bonaly, near Edinburgh. C. was not a voluminous author, although he wrote some articles for the *Edinburgh Review*, chiefly on law reform. His best-known works are his *Life of Jeffrey*, published in 1852, and the *Memorials of his Times*, published two years after his death, containing glimpses of the Edinburgh society of the time in which he lived. This was continued by the publication in 1874 of his *Journal*, in 2 vols., a work principally valuable for the news gathered by C. of the 'Disruption' of 1843, which ended in the formation of the Free Church, of the events which led up to it, and of the men who took part in it. A volume of C.'s correspondence has also been published.

Cock'chafer (*Melolontha vulgaris*), the name given to a beetle of the tribe *Lammellicornes*, distinguished by the length and size of the leaves of which the terminal joint of the antennæ is composed. These leaves are largest in the male C., and fold up like a fan. The C. belongs to the *Phyllophaga*, or leaf-eaters. It is not common in Scotland, but occurs in England and Europe. The adult feeds on leaves, the larvæ feeding on the roots of corn and grasses. The C. is of a black colour, covered with a downy white substance, and is on an average an inch in length. It spends from three to four years in the grub or larval condition, but has not a long existence as the adult. The larvæ are very destructive to grasses, and occasionally immense hordes of these beetles appear in certain localities, and devastate the plant-surroundings. Such an invasion occurred in Galway in Ireland in 1688.


Cockchafer and Larvæ.

Cock'er, one of the spaniels, nearly allied to the Blenheim dog. Its colour is most usually of a blackish tint. The C. is of small size, and is employed in pheasant-shooting. Its ears are pendant, but the tail is not of great length.

Cocker, Edward, an arithmetician and caligrapher, was born probably in 1631 at London, where he died about the year 1677. C. was a schoolmaster by profession. His famous *Arithmetic* was published shortly after his death by John Hawkins. C. was also the author of a small dictionary, and of a book of sentences for writing, called *C.'s Morals*.

Cock'ermouth, a parliamentary borough in Cumberland, at the confluence of the Cocker and the Derwent, 25 miles S.W. of Carlisle. It is a station on the Penrith and Workington branch of the North-Western Railway. C. has considerable trade, manufactures of woollens, linens, cottons, hats, and hosiery, tanneries, breweries, and dyeworks. It returns one member to Parliament. Pop. (1871) 6936. The poet Wordsworth was a native of C. C., which is a place of considerable antiquity, has the ruins of a castle built soon after the Norman conquest. There is a fine promenade a mile long on the N. bank of the Derwent, with the old castle at one end and wooded cliffs at the other.

Cock-Fighting is now prohibited by Act of Parliament, under a penalty of £5 for each day that the offender has been connected with it.

Cock'le (*Agrostemma*), a genus of plants of the natural order *Caryophyllaceæ*, allied to *Lychnis*. The corn-C. (*A. Githago*) is a frequent and troublesome corn-weed in some parts of Britain and all over the continents of Europe and America, but is originally a native of Europe or the W. of Asia. The seed is still sold for medicinal purposes in Germany under the name of *black cummin*.

Cockle (*Cardium*), a genus of Lamellibranchiate mollusca included in the family *Cardiadæ*, the members of which possess equivalve shells of heart shape, with radiating ribs; the mantle is open in front, and the syphons are short. The foot is large and sickle-shaped. The common C. (*C. edule*) is a well-known edible mollusc of our coasts. It is enabled to take leaps of considerable extent by straightening its foot suddenly, and leaping through the impetus thereby gained. By means of the foot also these molluscs burrow in the sandy coasts in which they are found. A great many species exist. *C. Junonæ* is a second familiar species. Two adductor muscles exist for the purpose of closing the shell.

Cock'ney (from the Fr. *cocagne*—'*Pays de Cocagne*'—an imaginary land in mediæval mythology where the houses are made of cakes; perhaps formed from the Lat. *coquinus*, from *coquere*, 'to cook'), was a name given to the luxurious inhabitants of London, as opposed to the less effeminate denizens of the country. 'The King of Cockeney'—*i.e.*, of London—occurs in some verses ascribed to Hugh Bagot, Earl of Norfolk, in the time of Henry II. 'The Land of Cockaigne' is applied in a popular satire of the 13th c. to a Fool's Paradise for monks, in which the pleasures are all sensual.

Cock of the Plains (*Tetras urophasianus*), a species of grouse inhabiting N. America. It is the largest member of that family found in the New World; but is smaller than the Capercailzie (q. v.). The plumage is of a general yellowish-brown tint, the under parts being white, whilst generally it is mottled with dark tints. The males have bare sacs on the neck, which they can distend at will. C. occurs in California and Columbia. Its flesh is bitter, owing to the bird feeding on certain herbs (*Artemisia*, &c.).

Cock of the Rock (*Rupicola aurantia*), a Dentirostral (*Insessores*) bird, belonging to the Manakin family (*Piprinæ*), and so named from its possessing a singular double crest of feathers rising from the sides of the head, whilst the upper tail-coverts give the bird the appearance of a cock-like tail. It inhabits Guiana. Its colour is a fine orange, with the wing-gills and tail black. Another species (*R. Peruviana*) is found in Peru.

Cock of the Woods. See CAPERCAILZIE.

Cock'pit, a theatre in which gamecocks used to be exhibited fighting. The room in which Her Majesty's Privy Council meets at Westminster is so called, because it was built on the site of the C. of the palace at Whitehall. In *nautical language*, the term is applied to a place under the lower gun-deck, containing the rooms of several junior officers; here the surgeon keeps his medicine-chest, and attends to the wounded.

Cock'roach (*Blatta*), a genus of Orthopterous insects belonging to the Cursorial section of that order, and included in the family *Blattina*. All the legs are formed for running; the head is concealed beneath the thorax; the feelers are long and bristle-like; simple eyes or ocelli are generally wanting; wings may be wanting in the females only, or in both sexes; the hinder wings fold up fan-wise, the front wings forming elytra or wing-covers; spines exist on the tibiæ, and the tarsi are five-jointed. The body is flattened and ovate, and the abdomen is terminated by a pair of jointed appendages. *B. orientalis* is the common C. or black-beetle, found in great quantities in many houses. The wings in this species exist in the males only, and are rudimentary. These insects are supposed originally to have been imported from India. They occur also in ships, a second species, *B. Americana*, being found in the latter habitations. They are of nocturnal habits, devour animal and vegetable matters, and exhale a disagreeable smell. *B. gigantea* is a large W. Indian species, also named the *Drummer*, from its making a knocking noise in the night-time. The eggs are enclosed in horny cases, and are arranged therein in a double row, each egg being partitioned off from its neighbour. *B. Lapponica* occurs in Lapland.

Cocks'comb (*Celosia cristata*), a plant belonging to the natural order *Aurantiaceæ*, is a native of the E. Indies, and is now extensively cultivated in our conservatories, and in the open air in warm localities.

Cocksfoot Grass (*Dactylis*), a genus of grasses, of which one species, *D. glomerata*, the common C., is generally distributed over the cooler portions of Europe, Asia, N. America, and the N. of Africa. In Britain it forms one of the best of our pasture grasses, growing well on most lands, particularly where the soil is loamy or chalky. It is also suitable for growing on boggy soils under course of reclamation. In America it is called the *orchard grass*. Twenty-nine species are described by Steudel.

Cock's-Spur Thorn. See CRATÆGUS.

Cock'swain, or Coxwain (pron. *cosn*), is the commander of a boat's crew, and steersman of the boat. The *cosn's* whistle

brings his men together on the shortest notice. The word is formed from the Welsh *cwch*, 'a boat,' and '*swain*,' properly a servant, but here the petty officer in command.

Co'coa, Caca'o, or Co'co (*Theobroma C.*), a tree belonging to the order *Byttneriaceæ*, from the seeds of which the drinks called C. and chocolate are prepared. It is a native of Mexico, Demerara, and other portions of tropical America, but is now naturalised in various other tropical countries, such as Martinique, the W. Indies, Colombia, the Philippine Islands, Guiana, the Canaries, &c. About the year 1520 the seeds were introduced into Europe as a medicinal agent. The tree is much branched, and attains a height of from 16 to 20 feet on an average, though occasionally it grows to twice that height. It produces ovoid fruits, each of which contains from 13 to 40 seeds—the *C. beans* of commerce. After being shelled and bruised to pieces, they constitute *C. nibs*. The seeds are extracted from the fruits by their being allowed to ferment for some time, and then opened by hand, or by being buried in the earth until the pulp becomes rotten, after which the seeds are dried in the open air or by means of a fire. The last method of extracting the seeds produced the *Cacao terré* of the French manufacturers, and is by some considered as yielding the best C. In commerce there are two kinds of C., viz., Caraccas C. from Caraccas, and Island C. from Bourbon, Mauritius, the W. Indies, &c., which is less esteemed than the first-named quality. Most of the C. used in England comes from Guyaquil. It is very nutritious, chiefly owing to the soft, solid oil known as *C. butter*, which forms more than 50 per cent. of the shelled bean. The rest consists of starch, gum, mucilage, gluten, albumen, &c., and a crystallisable principle called *Theobromine* analogous to Caffeine (q. v.). It is prepared for use in various ways. First it may be prepared as Chocolate (q. v.), or by grinding up the roasted seeds with their outer shells or husks between hot cylinders into a paste, when it is then mixed with starch, sugar, &c. This forms *common C.*, *soluble C.*, &c., or the *C. nibs* already mentioned. This latter is the purest form of C. The husks are sometimes imported from Italy under the name of 'miserable,' and are used in Ireland and Italy for making a thin, though wholesome and agreeable, beverage in favour with the poorer classes of these countries.


Cocoa—(Flower, Fruit, and Leaf).

Altogether it is calculated that C. in one form or another forms the beverage of about 50,000,000 of people, and that the consumption is about 100,000,000 lbs. annually. In 1867 nearly 12,000,000 lbs. were imported into Britain. From the pulp which surrounds the seeds a kind of spirit is distilled. C., as a beverage, is nourishing and wholesome, and is also used as a menstruum for administering various medicinal substances, and the *butter* is official in the English pharmacopœia. As an emollient, and as an ingredient for making 'suppositories,' it is valuable from not becoming rancid. C. mixed with rice, meal, starch, sugar, and flavoured with vanilla, constitutes the *Racahout* of the Arabs.

Co'coa-Nut, or Coco-Nut (*Cocos nucifera*), a species of palm, a native of the Indian coasts and the South Sea Islands, but now naturalised in suitable situations in most tropical countries. It always prefers the vicinity of the sea-shore, though sometimes found at a considerable distance inland. It is one of the most graceful of its order, often rising to the height of from 60 to 100 feet, in a stem not over 2 feet in diameter. With the exception of the bamboo, there is perhaps no plant which is applied to so many and so varied uses as the C. From the husk surrounding the nut, coir or fibre is manufactured, and out of this mats, brushes, cables, &c., are made. In Southern India and other countries the fruits form one of the staples of life. The oil extracted from it is used in cookery when fresh. By pressure, stearine, used in making candles, can be extracted from it. The shells are made into spoons, drinking cups, lamps, &c.; when burnt furnish an excellent charcoal and lampblack. 'Toddy' is made out of the fresh sap, as already described in the case of other palms, and vinegar, arrack, and sugar are also some of the products of this juice. The leaves are used for thatching houses, making mats, baskets, hats, &c. The terminal leaf bud is boiled and eaten as a pot-herb. The hard wood is used for an infinite variety of purposes, and in this country is familiar under the name of 'porcupine wood,' out of which ornamental boxes, &c., are made. It is even considered that the flowers are potent as an astringent, the roots as a febrifuge, and the milk as a cure for ophthalmia. With this category of uses we have by no means exhausted the list of economic purposes to which the C. are applied, which are, indeed, almost endless. There are about a dozen other species of *Cocos*, one of the most interesting of which is *C. butyracea* of New Granada. From this tree toddy is also extracted, but the method adopted is somewhat different from that employed in other countries. The tree is cut down, and a long cavity excavated in the trunk near the top; at the end of about three days this cavity is found filled with the sap, which constitutes 'toddy.' *C. coronata*, a small Brazilian species, has a quantity of starch stored away in its loose pithy interior, which is used as food.


Cocoa-nut Palm.

The *Double C.*, the *Coco de Mer*, *Coco de Salomon*, *Coco des Maldives*, is *Lodoicea Sechellarum*.

Cocoa-Nut Beetle (*Batocera rubus*), a genus of *Longicorn* Coleoptera or beetles, the larvæ of which inhabit cocoa-nut trees and eat into the stems. The larvæ are eaten by the natives of the E. Indies, and are of large, soft conformation.

Cocoon', the shell or covering of fibrous material in which many species of insects are protected during their pupa or chrysalis condition. The cocoons of several species are of very great industrial importance, especially those of the moth *Bombyx mori*, or the silkworm, which is the source of all ordinary silk. Several other species of moths yield silky fibre used in textile manufactures, the most important of which is the Tusseh or Tussur moth of India, *Antheræa paphia*, which spins a large grey-coloured C. from which a very strong silky fibre is derived. In addition, the Ailanthus moth, *Attacus cynthia*, has been introduced from China for culture in France, and silk is obtained from a hybrid between it and the Arrindy moth of Bengal, *Attacus ricini*. Among other valuable cocoons may be mentioned the Moonga of Assam, *Antheræa assama*, which forms one of the principal exports of that country; and the Mezankooree of the same region, the *Antheræa mezankooria*, from which much of the native dress of Assam is made; and the Yama-mai or oak silkworm of Japan, *Antheræa yamamai*, which has been introduced into Europe. There are, besides, numerous other species of *Bombyx*, *Attacus*, *Antheræa*, which yield useful silk both in the Old and New Worlds.

Co'cum Oil, a vegetable butter obtained from the seeds of an Indian tree (*Garcinia purpurea*) belonging to the same genus as the mangosteen. It is of a pale greenish-yellow colour, and very friable. C. is exported to Britain, where it is used in the manufacture of pomatum.

Cocy'tus, a tributary of the Acheron, in Epirus, and supposed by the ancient Greeks to be connected with the lower world. In their mythology it was one of the rivers of Hades, and is mentioned in the Odyssey. Virgil also assigns it a place in Tartarus, as with the Pyriphlegethon flowing into the Acheron. The name is derived from *kōkuein*, to shriek, to wail. Hence Milton's—

> 'Cocytus, named of lamentation loud
> Heard on the rueful stream.'

Cod (*Gadus Morrhua*), a genus of Teleostean fishes belonging to the sub-order *Anacanthina*, and to the family *Gadidæ*, which also includes the haddocks, whitings, &c. The ventral fins are jugular in position, that is, exist on the throat beneath the pectoral fins. The body is spindle-shaped. The scales are soft and

of small size. The median fins are large. The lower jaw is furnished with a *cirrhus* or barbule. Three dorsal and two anal fins exist. The fishery of the C. forms a source of industry, which gives employment to thousands of men on the coasts of Britain, Holland, Sweden, Norway, Iceland, Newfoundland, and elsewhere. The flesh is eaten both in a fresh and salted state. The air-bladder and roe are regarded as delicacies, and from the liver is obtained the cod-liver oil which, in tubercular and phthisical complaints, is so invaluable a remedy. The fishery is carried on by hand-lines chiefly, the bait being cuttle-fishes, shellfishes, &c.

Varieties of C. (rock and red C.) exist, and the Dorse (q. v.) is sometimes named 'Baltic C.' The average length of the C. is 2½ or 3 feet, and its weight from 10 to 12 lbs.

Co'da (Ital. 'tail,' Lat. *cauda*) is a name given to a phrase or passage sometimes added, like a peroration, at the end of a musical composition.

Coda'rium, a genus of plants of the order *Leguminosæ*. *C.* (*Dialium*) *acutifolium* and *C. obtusifolium* yield the Sierra Leone fruits known as brown and velvet tamarinds, the pulp of which has an agreeable flavour, and is very commonly eaten.

Code (Fr. *code*, Lat. *codex*, older form, *caudex*). A collection and chronological arrangement of the laws of a state is sometimes so named, but this is usually called a *Digest;* and by a C. we generally denote a legal system which, though it may adopt some existing laws and customs, is founded on principles fundamentally new, such, for instance, as are advocated in the *Fragment on Government* and other writings of Jeremy Bentham. Roman law was first reduced into a C. by order of the Emperor Theodosius, A.D. 438. This, under the name of the *Theodosian C.*, continued for some centuries to be the only authoritative compilation recognised in the western part of the empire. The *C. Justinian*, whose authority prevailed in the eastern division of the empire, was compiled and finished by Tribonian about the year 533. It consists of the *Institutes*, or elementary principles of Roman law; of the *Digest* or *Pandects* (q. v.), containing the opinions of eminent lawyers; of a new C. or collection of imperial *Constitutions;* of the *Novels*, or supplementary C. These form the *Corpus Juris Civilis*, as published about the time of Justinian. They are the foundation of the legal systems of most of the states of Europe.

The old laws of the French monarchy were founded partly on Roman law, partly on custom, and partly on ordinances of the kings. In 1800 Bonaparte appointed a commission to form a scheme of a civil C. This was promulgated in 1803-4 as the *C. Civil des Français*. Under the Empire it was named the *C. Napoleon*, by which name it is still known. To judge of its value, we should read reports of the discussions in the French Council of State. See *Esprit du C. Napoleon tiré de la Discussion*, by Locré, and *Analyse Raisonnée de la Discussion du C. Civil au Conseil d'État*, by Malville. See also Savigny *On the Aptitude of our Age for Legislation*, translated from the German by a barrister, and Rehberg *Uber den C. Napoleon*. In Thibaudeau's *Memoires sur le Consulat* the original expressions of Bonaparte in discussion are preserved. The *C. de Procédure Civil* (1806) prescribes the forms of civil process, and the rules of the courts' practice. The *C. d'Instruction Criminelle* was promulgated in 1808, the *C. de Commerce* in 1808, the *C. Penal* in 1810. Regarding the last, Thibaudeau says:—'Napoleon was absent from its discussion. He said that the laws should be concise, and leave much to the judges and the government in imposing the penalty, because,' he said, 'men have feelings of compassion unknown to the law.' Under the head of *Violations des règlements relatifs aux manufactures, aux commerce et aux arts*, any coalition to lower wages is punishable by fine and imprisonment, and workmen combining to stop a manufactory are to be punished in the same way; leaders in both cases being subject to severer penalties. For comments and strictures by French jurists on their criminal C., see *De la Justice Criminelle en France*, by Bérenger, and *Leçons Préliminaires sur le C. Penal*, by Bavouse. For a general view of the judiciary system of France, see *Esprit des Institutions Judiciaires*, by Meyer, and *Des Institutions Judiciaires de l'Angleterre comparées avec celles de France, et des quelques autres États*, by Rey.

Among mediæval codes the fullest and best was that of the *Gothic Law*. It was initiated by Alaric, King of the Visigoths, and enlarged by his successors. The second was the Burgundian; the third the Salic Law (q. v.), whose history is somewhat obscure. It dates from the exodus of the French from Germany. The fourth or Frisian law dates from the times of Pippin and Karl Martel. The *Asegabuch*, a set of Frisian laws, was composed about A.D. 1200. A complete collection of them was published by Richthofen (*Fries. Rechtsquellen*, 1840). All these codes ultimately merged in the law of the feudal system.

Codification is the process of forming a C. of laws. It may be either done by public authority, as in the cases of the *Codex Theodosianus* and the *Codex Justinianus*, or it may be done by a private person, as were the codes Gregorianus and Hermogenianus. Many attempts have been made to procure the codification of the laws of England. Notwithstanding the earnest advocacy of Lord Brougham, these have hitherto been almost totally ineffectual.

Co'deine is an Alkaloid (q. v.) present in opium, and was first extracted from that substance by Robiquet in 1832. It is a colourless crystalline body possessing a bitter taste and a powerfully alkaline reaction, combines with acids to form crystalline salts, and is a narcotic poison. The composition of C. is represented by the formula $C_{18}H_{21}NO_3$.

Codiæ'um, a genus of Spurgeworts (*Euphorbiaceæ*) indigenous to the Moluccas and islands to the N. of Australia. *C. pictum* of the Moluccas is often cultivated about houses in that country, and used for fences. The leaves are strewed on the ground on festive occasions, and are also used to decorate triumphal arches. When chewed, both bark and roots excite a burning sensation in the mouth.

Cod'icil (Lat. *codicillus*, a dim. of *codex*) is a supplement or addition made to a will by the testator, adding to, explaining, or altering some part of his former disposition. It may be written on the same paper as the will, or affixed to it, or written on separate paper and deposited in a different place from that in which the will is placed. In general, the law relating to codicils is the same as that relating to wills, and the same guarantees of signature and attestation are required. A man may make as many codicils as he pleases, and the last is equally valid with the first, if not contradictory. See WILL.

Cod'lin, or **Codling**, a variety of apple, for boiling or roasting, and thence deriving its name, which is probably connected with *coddle* and *caudle*, the origin of which again is the Lat. *calidus*, 'warm.'

Codling Moth (*Pyralis pomona*), a moth (*Lepidoptera*) belonging to the Tortricina tribe. The larvæ live in apples (hence its name), and destroy much fruit. The caterpillars have ten feet, and roll up leaves to form a cocoon. The wings are short but of broad conformation.

Cod'liver Oil is obtained from the liver of the cod, torsk, and other members of the Gadidæ family of fishes, the chief centres of its production being Newfoundland and Norway. Three varieties are known in commerce by the names of 'white,' 'pale,' and 'brown,' the difference in colour arising from the various modes of preparation. A fourth and very impure variety, prepared in Norway, is largely used by curriers under the name of cod oil. In Newfoundland the process of preparation is very simple. The livers are taken, as fresh as possible, and well washed to remove traces of gall, &c.; they are then heated in a boiler with steam or boiling water till the oil rises to the surface, when it is removed, and excess of water driven off by heat. The oil is next strained through cloth bags of different degrees of fineness, an operation which effectually prevents the admixture of solid extraneous matter. C. O. thus prepared is almost devoid of smell, taste, or colour, and possesses valuable medicinal properties. In Newfoundland it is worth from 5s. to 6s. per gallon. The disagreeable taste and smell of ordinary C. O. are partly due to the putrefaction of very minute pieces of liver and other solid impurities not removed by filtration. Its proximate constituents are olein, palmitin, and stearin, with small quantities of butyric and acetic acids, and a peculiar substance called 'gaduin.' When taken internally, this oil supplies the system with nutritive fatty matter, and to this circumstance its efficacy in the treatment of pulmonary diseases is to be attributed.

Codogn'o, a town in the province of Milan, N. Italy, near the Po, 24 miles W. of Pavia, is a railway junction between Milan and Piacenza, has silkmills and linen factories, and an active trade in agricultural produce. Pop. 9632.

Cod'rington, Sir Edward, an eminent British admiral, was born in 1770, entered the navy in 1783, fought under Lord Howe, and at the battle of Trafalgar, in 1805, was captain of the *Orion*. In 1821 he was made vice-admiral, and in 1827 commanded the British, French, and Russian fleets which crushed those of Turkey and Egypt at the battle of Navarino. Although for political reasons he was recalled, C. continued to be honoured both at home and abroad, and in 1837 reached the dignity of Admiral of the Red. He sat for Devonport from 1832 to 1839, and died April 28, 1851. C.'s son, **Sir William John Codrington**, was born 1800, and entered the army as an ensign in the Coldstream Guards. On the outbreak of the Crimean war, he was made commander of a brigade of the Light Division, took part in the battles of Alma and Inkerman, and on the resignation of General Simpson, was appointed commander-in-chief of the English forces. On his return to England he entered Parliament as member for Greenwich in 1857, but accepted the governorship of Gibraltar in 1859. He was made a G.C.B. in 1865, and has received various foreign honours—French, Sardinian, and Turkish.

Cod'rus, the last King of Athens, according to the Greek legend, reigned about 1068 B.C. The Dorians having invaded Attica, the oracle declared that their success depended on the life of C. being spared. The Attic King, learning this, entered the hostile camp in disguise, and quarrelling with the soldiers, was slain. On this the Dorians returned home. The kingly authority was henceforth abolished at Athens by the Eupatrids, and Medon succeeded his father as Archon for life.

Coëffic'ient (Lat. 'together-making'), in algebra, is one of two factors, simple or compound, which together make up an expression. Thus, in $4\ ab^2c^3$, $4\ ab^2c^2$ is the C. of c, $4\ ab^2$ of c^3, $4\ ab$ of bc^3, abc of $4\ bc^2$, &c.

Cœ'hoorn or **Cohorn, Menno, Baron Van**, a great military engineer, was born near Leeuwarden, in Friesland, in 1641, studied fortification under his uncle Bernardus Fullenius, Professor of Mathematics and Engineering at Franeker, entered the army at the age of sixteen, and after distinguishing himself in various battles and sieges, particularly those of Maestricht and Namur, rose to be lieutenant-general and chief director of Dutch fortifications, and the trusted engineer of William III. Of the towns he fortified, Bergen-op-Zoom is considered to be that which most unmistakably shows his genius. C., who has deservedly been called the Dutch Vauban, died at the Hague, March 17, 1704. He wrote several books, of which the *Nieuwe Vestingbouw* ('New System of Fortification,' Leeuw. 1685, new ed. 1702) is the best known. It was translated into many European languages. See Nicolas Ypey's *Narratio de Rebus Gestis Mennonis Cohorni* (Franek. 1771).

Coe'horns, so called from the engineer of that name, are small howitzers or mortars, about 4⅗ inches calibre, which, being easily moved, and requiring but a small amount of powder, were at one time much used in sieges, especially in pouring shells into the outworks of a fortress.

Coel, a town of British India, in the N.W. province, district of Allyghur, 2 miles S. of Allyghur and 80 S.E. of Delhi. It is a station on the East Indian Railway, and the residence of the civil authorities of Allyghur, with which town it is connected by a fine tree-shaded avenue. Pop. (1872) 48,403.

Cœlelmin'tha, literally 'hollow worms,' the name formerly given to certain groups of parasitic worms or *Entozoa*, belonging to the sub-kingdom *Annuloida* or *Echinozoa*, and included in the order *Nematelmia* or 'round worms.' Owen gave this name to these groups, in allusion to their possessing a distinct body-cavity, and in contradistinction to the Tape Worms (q. v.), and others, which possess no alimentary canal or body-cavity. The *Ascaris* or round worms, *Strongylus*, and *Filaria* or the Guinea-worm, are illustrative examples of C.

Cœ'le-Syr'ia (Gr. 'Hollow Syria'), now known by the Arabic name *El-Bŭkâ'a* ('the deep plain'), is properly defined by Strabo as the valley between Libanus and Antilibanus (about 100 miles long by 10 broad), but sometimes erroneously made to include the coast of the Mediterranean. The Lowland Scotch expression for districts similarly depressed is exactly the same, *e.g.*, 'The Howe of the Mearns,' and 'The Howe of Fife.'

Cœnæsthe'sis, a term designating undue susceptibility to external impressions. Some persons are susceptible of slight changes in the circumstances of their lives, while others are not so. To some individuals freedom from anxiety, good digestion, a bright sun and a dry bracing air, is the cause of cheerfulness, exhilaration, or even of joy; while some mental cause of depression, a slight disorder of digestion or of excretion, or a dull day, may cause gloominess and even despair. (Carpenter's *Mental Physiology*.)

Cœ'nobites ('dwellers in a *cœnobium*,' from the Gr. *koinos*, 'common,' and *bios*, 'life'), the name given to monks in the 4th c. who lived together in the same dwelling under an abbot or head, as distinguished from those who lived alone or solitary, as 'monks' (in the original use of the word) or *anchorites*.

Cœnu'rus, the name formerly given to several of the so-called Cestoid Worms (q. v.), which are now ascertained to represent merely stages in the development of the Tæniada or Tapeworms (q. v.) and their allies. The Cœnuri are, in fact, the *scolices* of Tæniada, and if swallowed by a second animal, develop into tapeworms. Thus the *C. cerebralis* found in the brain of the sheep, and causing the 'staggers' of that animal, when swallowed by the dog developes into the characteristic tapeworm (*Tænia serrata*) of the latter form. The cystic worms exist as cyst or bladder-like bodies, which are embedded in animals, and attached by a short neck and head—the latter being the head of the future tapeworm. See also CESTOID WORMS and TÆNIADA.

Cœ'rulein is a dye recently introduced for dyeing and calico-printing, and is obtained by treating Gallein (q. v.) with concentrated sulphuric acid at 200° C. (392° Fahr.). A beautiful green colour is produced by dissolving C. in an alkaline solution. In calico-printing this solution and the mordant alumina yield a rich green, while iron mordants produce a brown colour; both dyes are fast. On treating a hot aniline solution of C. with alcohol and acetic acid, an indigo-blue colour results, which may be communicated to wool.

Coff'ee (*Coffea*), a genus of *Rubiaceæ* or *Cinchonaceæ* (for opinions differ), consisting of between fifty or sixty species, but only one of which produces the fruit from which by decoction can be made the beverage known as *C.* All are shrubs or small trees under 20 feet in height, natives of the tropics—the greater number of the species being found in the western hemisphere. The most important is *Coffea Arabica*, which grows to a height of about 20 feet, but when cultivated is seldom allowed to attain to more than 10 or 12 feet. Though now cultivated solely within the tropics, the native country of the C. shrub is the mountainous country at the extreme S.W. point of Abyssinia—the word *C.* being derived, according to some, from *Caffa*, the name of one of the Abyssinian provinces; though it is more probably the Arabic *quahwah*, pronounced by the Turks *kahve*, whence the French *café*. From Abyssinia it was introduced into Arabia, and from Arabia to Batavia, about two centuries ago, by the Dutch. Whether it was the Dutch or French who first introduced C. into the western hemisphere is a disputed point, but at all events it is agreed on every hand that all the C. now imported from Brazil, Central America, the W. Indies, &c., is the progeny of a single plant, most probably derived from the Botanic Garden at Amsterdam, into which it was introduced from Batavia. Its use as a beverage soon spread among Eastern nations, though at first it was opposed by the priests, on the ground of its being one of those intoxicating beverages forbidden by the Koran. In 1652 the first C.-shop was established in London by a Greek named Pasquet, the servant of an English merchant—a Mr Edwards, who had got acquainted with the



Coffea Arabica.

beverage in the E., but who, to save himself from the annoyance of visitors anxious to taste the new drink, established his servant in a house where it could be bought. From this date the use of C. rapidly increased, and spread into the European continental countries, where it is now more used, and prepared to greater perfection, than in Britain. At the present time the consumption in Europe and the U.S. alone is estimated at 900,000,000 pounds—the greater part of this being from Brazil, though most of the C. consumed in Britain comes from Ceylon. In 1872 there were imported into Britain 166,269,052 lbs., of which 31,173,555 lbs. were retained for home consumption. The duty on this import was 14s. per cwt. for raw, and 2d. per lb. for roasted beans. The consumption for the whole world is estimated at 720,000,000 of lbs. Of this, the U.S. consumed the greatest quantity, and Britain the least. After the berries are ripe they are gathered, and deprived of their outer pulp by machinery, then steeped in water to remove all mucilaginous matter, after which the parchment-like covering of the seeds is removed by means of a mill and a winnowing machine. They are now roasted, the heat not only reducing the berries to one-half their original bulk, but also causing the development of a volatile oil and a peculiar acid to which the flavour and aroma of the C. is due. In Sumatra and other of the Malay islands, an infusion of the roasted leaf is used, under the name of C.-tea. It is said to contain a large quantity of Caffeine (q. v.), which constitutes the active principle of the C., and it is probable that the use of the leaf may extend. In Central Africa Speke describes the natives as chewing the C.-beans instead of making a decoction of them. The physiological effect of C. is that it acts as a stimulant to the brain, causing sleeplessness, and is accordingly used as an antidote to narcotic poisons. According to the most widely received belief, it acts like tea as a soother to the vascular system, and by preventing waste of the tissues of the body, enables it to support life on a less quantity of food than would be otherwise required for the maintenance of animal existence. Cocoa (q. v.), Paraguay Tea (q. v.), and other beverages which have a similar effect on the system, also contain a principle analogous to caffeine, but neither Chicory (q. v.), nor any of the numerous substitutes for C. do so, or have any pretensions to act in a similar manner on the system, except that they supply to the palate a sensation not unlike that of C. For instance, what is called Swedish C. is the seeds of *Astragalus bœticus*.

Essence of C. is a very concentrated infusion or decoction, mixed with extract of chicory and burned sugar until it is of the consistency of molasses. A teaspoonful, mixed with boiling water, makes a useful substitute for the legitimate decoction of the ground C.-beans. The name Wild C. is given in the W. Indies to *Faramea odoratissima*, *Zuelania lætioides*, and *Eugenia disticha*.

Coffee-Bean-Tree, or **Coffee-Tree, Kentucky**. See GYMNOCLADUS.

Coffee-Bug (*Lecanium coffeæ*), a genus of Hemiptera (*Homoptera*) belonging to the family *Coccidæ*, and so named from its destructive inroads on the coffee plantations. Ceylon has particularly suffered from its ravages. *Lecanium Ilicis* is an allied species which lives on the *Ilex* or evergreen oak of the Mediterranean coasts. The red ants are in turn destructive to the C.-B.

Coff'er (Fr. *coffre*, 'a chest;' Gr. *kophĭnos*, 'a basket') is the name given to a casket for keeping jewels and other valuable articles; the term being sometimes applied to a chest. In architecture, it denotes a deep panel in a ceiling, the same as a caisson; in fortification, a particular kind of *caponnière*. See CAISSON, CAPONNIÈRE.

Coffer-Dam, a water-tight enclosure within which the foundations for a bridge abutment, quay wall, or other such structure may be excavated and the masonry built. A C.-D. commonly consists of two continuous rows of wooden piles driven in the ground, and left sufficiently long to reach above high-water mark. The rows are several feet apart, and the space between them is filled with clay puddle, so as to make a thick wall impervious to water. The water is pumped from the enclosed space, so that excavation and erection can go on within it, without the use of divers, at all states of the tide. Of late years cast-iron has in a number of instances been used with success instead of the wooden piling.

Coff'in, a chest or box, in which a dead body is interred. The word is probably derived from *cophinus*, a Latinised form of the Greek *kophinos* ('a basket'), though it must be noted that no such use of *kophinos* was known to the ancients themselves. In the East at the present day a dead body is consigned to the earth wrapt merely in a cloth or 'winding-sheet,' which Mohammedans express by the Arabic word *kafan*, and it is probable that to it our English word is to be traced. In early times the bodies of persons of distinction were deposited in coffins, and when Joseph died, 'they embalmed him, and he was put in a C. in Egypt.' The Egyptians enclosed embalmed bodies in cases of cedar, which are still found in a state of almost perfect preservation, from the dryness of the rock tombs where they were deposited. Coffins of wood and burnt clay have been found at Athens; and while it was customary for the Greeks to burn dead bodies, recent investigations seem to prove that burial of unburnt corpses in coffins was equally frequent. Among the Romans, too, inhumation in coffins of wood and stone was practised. Pliny mentions that a kind of stone found near Assos in Troas, was made into coffins which speedily consumed the corpse. (See SARCOPHAGUS.) The kistvæn or C. of the ancient Britons was formed of rough slabs of stone; during the tenth and two following centuries, stone-coffins were in common use in England, and towards the end of that period they were employed in the interment of monks, whose bodies before that period were laid in the earth. Coffins both of lead and wood, belonging to the Old English and later periods, have also been discovered, those of the Templars found in the Temple Church in London being of the former material. The present mode of sepulture in closed coffins has recently been condemned on sanitary grounds, retarding, as it does, the resolution of the body into its component elements, and the question of adopting cremation has been openly discussed. As a compromise between the two modes, Mr Seymour Haden has suggested the use of coffins of basketwork and other easily perishable materials of open construction, which will accelerate the dissolution of the body, by freely admitting air and moisture, and in cases of death from infectious disease, he has proposed to use a double basket case, the intermediate space being filled with charcoal powder.

Coffin also signifies the raised crust of a pie, and in this sense it is frequently used by Shakespeare; and the whole hoof of a horse's foot above the coronet is so named in veterinary practice.

Cogg'eshall, a market-town of Essex, on the Blackwater, 40 miles N.E. of London, and 10 W. of Colchester, is a station on the Great Eastern Railway. It is connected with Little C. (pop. 367) by a bridge across the river, and contains a beautiful church, St Peter's, restored in 1868, a grammar-school, endowed by Sir Robert Hitcham, a mechanics' institute, a public library, &c. Its manufactures are chiefly silk, velvets, patent isinglass and gelatine. In 1142 King Stephen here founded a Cistercian abbey, part of the ground-plan of which was discovered in 1865. Pop. (1871) 2916.

Coggia's Comet, the last comet visible without telescopic aid to our earth, appeared in the summer months of 1874 in the northern hemisphere. The nucleus was bright and well-marked, and the tail could be traced for a considerable distance in the sky. Tietjen, Schulhof, and Geelmuyden have given calculations which all agree in assigning to it a great length of revolution, the period deduced by the last being 10,445 years.

Cogn'ac (Lat. *Cogniacum*, 'the corner of the water;' Fr. *coin*, Lat. *cuneus*), an old town in the department of Charente, France, on a height overlooking the plains of the Charente river, 20 miles W. of Angoulême. It gives name to the famous brandy, of which it exports £3,600,000 worth annually, and has also large manufactures of leather, linseed oil, and pottery. There are two important fairs held here in May and November. C. is the birthplace of François I., and its only historical building is a ducal château, now converted into a store. Pop. (1872) 12,761.

Cog'nate. See AGNATE.

Cog'nition, or **Cog'noscing**, is a process in Scotch law for inquiring into the mental condition of any one suspected of being idiotic or insane. See under BRIEVE, *Brieve of Idiotry and Furiosity*.

Cognition and Sale is, in the law of Scotland, the name given to a process before the Court of Session, at the instance of a Pupil (q. v.) and his Tutors (q. v.), for obtaining a warrant to sell the whole or a part of the pupil's estate.

Cognitionis Causa.—In Scotland, when the creditor of a deceased proprietor brings an action against the heir to constitute the debt against him, and the heir renounces the succession, the court will give a decree for the debt. This is called a *decree C. C.*

Cognition and Sasine is, in the law of Scotland, the form of entering an heir in burgage property.

Cogn'izance, a name given rather indefinitely to a distinguishing mark in heraldry. See BADGE and CREST.

Cognoscen'ti (Ital. form of the Lat. *cognoscentes*, 'knowing ones'), critics in matters of art, whose *knowledge*, genuine or otherwise, is their title to the function they assume.

Cogno'vit Actio'nem, an English law-term, indicating the written confession of a defendant that the cause of action against him is just. Judgment may then proceed on the C. A., and execution follow according to the terms agreed to in the writing.

Cohabita'tion, in the law of Scotland, means the living together of a man and woman as husband and wife. It may constitute marriage as implying contract. See CONTRACT, MARRIAGE.

Co'heir or **Coheir'ess**, one of two or more persons among whom an inheritance is divided. See SUCCESSION, COPARCENARY, COMMON TENANCY, &c.

Cohe'sion, that property of a homogeneous portion of matter on which depends its resistance to any straining or disrupting force. It is thus distinct from Adhesion (q. v.), which is a similar molecular attraction subsisting between two different portions of matter in contact. Both seem to be superficial attractions, independent of mass, and quite inappreciable at sensible distances. C. is most strongly marked in solids, and its experimental determination in the case of material used for purposes of construction, is of the greatest importance in practical engineering. Liquids possess the same property, though to a less extent, otherwise they could not hold together as drops. Further, all the curious phenomena of Capillarity (q. v.) are due to the simultaneous and mutual action of C. in the liquid, and adhesion between the liquid and some other kind or kinds of matter. The so-called C. and submersion figures of Tomlinson are also capillary phenomena, which are best noticed here, and are thus produced. When a drop of liquid is gently placed on the clean surface of a specifically heavier liquid, the former is observed to spread out according to a definite pattern, which is different for each pair of liquids, thus suggesting, as Tomlinson pointed out, a method of analysis. This is a C.-figure. Submersion-figures are formed by the gradual sinking of a liquid through a specifically lighter one; and some of these are extremely beautiful and regular, the vortex rings produced in many instances being singularly perfect. It is a common error in popular science to say that gases have no C., but even possess among the particles a repelling action. Such an hypothesis, however, is of absolutely no use in the molecular theory of gases, and adds a complexity which is not to be desired. C. acts between the particles *when they are sufficiently near*, but owing to their velocities at collisions, these particles rebound almost instantaneously, so that the cohesive forces act during a practically indefinitely short time, and are not sufficiently great to overcome the energy of motion of the particles.

When a solid is heated it generally expands, the molecules being driven further apart, and consequently the cohesive forces diminished in intensity. At length the solid melts, and the molecules acquire a certain freedom, the energy of heat being transformed into energy of motion; but the velocities are not sufficiently great to neutralise the effects of C., which is still apparent. By the application of more heat, however, the fluid expanding becomes more mobile, expands, and the molecules get more active, till at last their velocities become so great that the effects of C. are no longer evident—the liquid becomes a gas. Thus, though increase of temperature has a powerful effect upon cohesive forces, it seems to be only because the distances between the molecules and their velocities are increased; but it affords an argument in favour of the energy-nature of heat, placing it in the same category with motion.

Co'hort, a division of the legion, in the ancient Roman armies. There were always ten cohorts in a legion, and during the republic these were all equal to each other. Hence the strength of the C. varied with that of the legion, and ranged at different periods between 300 and 600. Under the empire the first C., which had charge of the eagle, was twice as strong as each of the other nine. The word was sometimes loosely used in the general sense of *battalion*.

Cohune' Oil, a valuable oil obtained from the kernels of a Brazilian palm, *Attalea cohune*.

Coif (Fr. *coiffe*, a head-dress, from Lat. *cofea*, used by Fortunatus), a defensive hood which was worn as a portion of a soldier's armour in the middle ages. It was sometimes continuous with the hauberk, and sometimes separate. The name was also given to a covering for the head, especially of the tonsure, worn by Roman Catholic priests. In legal language, it is the cowl or cap worn by serjeants-at-law—a relic of the ecclesiastical character of lawyers. To become a serjeant-at-law is the same thing as to attain the *Degrees of the C.*; after which a barrister leaves the Inn of Court which called him to the bar to become a member of Serjeants' Inn.

Coimbatore', the chief city of a district of the same name, in the province of Madras, British India, on the left bank of the Noyel, a tributary of the Cauvery, on an elevated and dry situation on the southern declivity of the Neilgherries. It is very healthy, as from its proximity to the Palgatcheri, a depression traversing the Western Ghauts from E. to W., it is ventilated both by the N.E. and S.W. monsoons. C. was taken by the British in 1783, and again in 1790. Pop. 12,000.—The *district of C.* has an area of 8470 sq. miles, and a pop. (1872) of 1,430,738, of whom 1,386,915 are Hindus, and 15,549 Christians. It comprises a portion of the Neilgherries, one peak of which is 9000 feet above the sea-level. The remainder is an undulating tableland of no great elevation, great part of the soil being fertile, and producing cotton, rice, and tobacco.

Coim'bra (anc. *Conembrica*), a city of Portugal, capital of the province of Beira, on the right bank of the Mondego, 110 miles N.N.E. of Lisbon, built on the slope of a hill in the form of an amphitheatre. The streets are steep, narrow, and ill-paved; but there are several fine buildings, including the cathedral and the university—the only one in Portugal—originally established in 1290, and transferred here a second time from Lisbon in 1537. George Buchanan (q. v.) was for some time a professor at C. Being accused of heresy, he was imprisoned in a monastery, where he commenced his Latin metrical version of the Psalms. The library of the university possesses 60,000 volumes. C. has manufactures of earthenware, linen, and woollen. Pop. (1871) 18,147. Since 1816 the university has possessed five faculties—theology, law, medicine, philosophy, mathematics. It has a library of from 40,000 to 50,000 vols., an observatory, a chemical laboratory, and a museum, with an anatomical theatre, and various scientific collections. The number of professors and lecturers is 46, and of students, nearly 900.

Coin, Coining (Fr. *coin*, Lat. *cuneus*, the 'wedge' by which money was stamped). See MINT, MONEY, CURRENCY, NUMISMATICS.

Coin, Coining, Laws Regarding. In 1861 the laws of the United Kingdom relative to the coinage were consolidated and amended. To counterfeit the gold or silver coinage is felony, punishable at the discretion of the court by penal servitude for life or for not less than three years. To diminish or lighten the gold or silver coinage is felony. To attempt knowingly to pass any counterfeit C. is a misdemeanour punishable by imprisonment for a year, with or without hard labour. To deface the coinage by stamping any name or words on a C. is a misdemeanour. C. defaced is not a legal tender. To counterfeit foreign gold or silver C. is felony. Having coining tools is a felony, rendering the possessor liable to penal servitude for life. The Coinage Act of 1870 consolidates and amends the laws relating to the coinage and to the mint. Gold is a legal tender for any amount. Silver is a legal tender for any value not exceeding forty shillings, and bronze C. is so to the value of one shilling. The Act deals with the defacing of light C., and with the coining and purchase of bullion at the Mint. See MINT.

Coir, or **Cocoa-Nut Fibre,** is a material usefully employed in the manufacture of ropes, cords, mats, &c. It possesses in a high degree all the requisite qualities—strength, firmness, and elasticity. In the Laccadive Islands, cordage and rope-making form a considerable branch of industry, and in many of our prisons and industrial schools the imported fibre is used for making cocoa-nut mats.

Coix. See JOB'S TEARS.

Cojutepeo', a town of San Salvador, Central America, with a pop. of 15,000. A few miles off there is a lake of the same name, which exhibits a remarkable phenomenon. After a gale its waters assume a dark greenish hue; and fish in considerable quantities are cast ashore dead.

Coke (lit. '*cooked*' or '*caked*' coal) is a substance 'which bears the same relation to coal that wood charcoal does to wood.' It is obtained by heating coal to a high temperature in a closed vessel, or its equivalent, and consists essentially of the fixed inorganic matter of the coal with a considerable part of its carbon. It is most commonly prepared in ovens called C.-ovens, which, when filled with coal, are closed up excepting an opening for the exit of gases, and some small holes for admitting air. The coal is ignited at the top, allowed to burn until no further visible smoke is emitted, and then cooled gradually. C. contains from 6 to 12 per cent. of incombustible matter (ash), but *exclusive* of this it is nearly pure carbon. It burns freely, without smoke, and without caking or clinkering (q. v.) upon the fire bars. It is also free from some of the impurities of the coal from which it has been made, and for these and other reasons, it forms in many cases a most useful fuel. It was at one time used exclusively for many purposes (*e.g.*, the smelting of iron), for which it is now found practicable to use the fuel in its natural state as coal. C. can only be made from that class of coals known as 'caking' coals, which tend to soften and clinker by heat, and which it is on that account difficult to use in ordinary furnaces without mixture with some non-caking fuel. In its conversion into C., coal loses from a quarter to nearly a half of its weight, this loss including the greater part of its hydrogen, nitrogen, and oxygen. The cause of the phenomenon of caking, or forming C., is not at present known. It has been connected with the proportion of oxygen in the coal, but although in the average caking coals contain much less oxygen than those which do not cake, yet analyses show that, in many instances, the ultimate composition of specimens of both kinds is almost identical. It is probable that this property of caking (as well as many other properties of coal) depends rather upon the proximate than upon the ultimate constitution of the fuel, and of this we have as yet scarcely any experimental knowledge.

Coke, Sir Edward, an eminent English judge and jurist, was born at Mileham, in Norfolk, February 1, 1552. He was educated at the free grammar-school of Norwich, and at Trinity College, Cambridge, and, after a course of law study at Clifford's Inn and the Inner Temple, was called to the bar in 1578. His professional career was one of brilliant and rapid success. He filled in succession the posts of Recorder of Norwich, Recorder of London, Solicitor-General, Speaker of the House of Commons, and Attorney-General. Although the manner in which he conducted the prosecutions of Essex and Raleigh did not add to his reputation, he gained on the whole a high character as a judge. In 1606 he was appointed Chief Justice of the Common Pleas, as a reward for the way in which he conducted the prosecution of those concerned in the Gunpowder Plot; in 1613 he was made Chief Justice of the King's Bench, and refused to yield a jot of the judicial prerogatives to James I., for which, as well as for persistently opposing the court party in Parliament, he was both disgraced and imprisoned. Under Charles I., he continued an advocate of the popular cause, and in 1628, during the third Parliament of that monarch, took a leading part in the preparation of the celebrated Bill of Rights. He died 3d September 1633. C. has been well described by Mr Green in his *Short History of the English People* as 'a narrow-minded and bitter-tempered man, but of the highest eminence as a lawyer, and with a reverence for the law that overrode his every other instinct.' His works, including his *Reports* and *Institutes*, the first of which is the famous *C. upon Littleton*, are among the most valuable of British law classics.

Col (Fr. a doublet of *cou*, 'neck,' from the Lat. *collum*, of the same signification), applied in Alpine geography to a mountain pass, as *C. du Géant*, *C. Cervin*, *C. Longet*, &c.

Co'la, Koll'a, or **Goora Nuts,** the seeds of *Cola* (*Stercularia*) *acumenata*, a tree belonging to the natural order *Sterculiaceæ*, inhabiting tropical Africa, and extensively used as a condiment by the natives of the western and central portions of that continent, and by the negroes of the West Indies and Brazil, into which countries it has been introduced. An extensive intertribal trade is carried on in this nut by the Africans. A small piece is chewed before each meal as an appetiser or aid to digestion, and to improve the flavour of any eatable or drinkable. It has an astringent taste. Bitter C. is obtained from Fernando Po, but its source is not yet ascertained, though it is believed to be derived from some species of *Guttiferæ*. There are also several varieties of the true C.-nut, all of which have, however, similar properties—among others, it is said, those of Cinchona Bark (q. v.).

Col'berg. See KOLBERG.

Col'bert, the name of a French family which in the 17th c. produced several distinguished men, was descended, according to a popular but now discredited tradition, from a Scottish house established in Champagne as early as the 13th c. The so-called 'tradition' cannot be traced beyond the rise of the great statesman's fortunes, and probably originated in a desire to find for him an ancient and aristocratic origin. Two branches of the C. family in the 17th c. are found pursuing commerce — one at Rheims, the other at Troyes. To the former belonged **Jean Baptiste C.,** Marquis de Seignelay, the illustrious French minister, who was born at Rheims, 29th August 1619, and received a practical training from the Italian bankers of Cardinal Mazarin, who recommended him warmly to Louis XIV. When appointed Comptroller-General of Finances in 1661, he established a chamber of justice, which suppressed great frauds in the collection of the revenue. Minister of Marine in 1668, he gradually acquired authority over the kinds and rate of taxation, the public regulation of commerce, agriculture, and manufactures, in fact, the whole non-military administration of the revenue. On his industry (he worked sixteen hours a day) and his integrity depended much of the glory of the reign of the 'Grand Monarque.' He raised the revenue from 89,000,000 to 105,000,000 francs, and reduced the debt from 52,000,000 to 32,000,000; and yet, fearing the prodigality of his master, he steadily opposed all borrowing by the state. As Sully had favoured agriculture, C. paid special attention to the cloth, silk, and hat trades, &c. His regulations of manufactures, enforced by public inspectors, were no doubt intended as a great act of national technical education, but they hampered trade in the most disastrous manner down to the Revolution. Political ideas led him to prohibit corn exportation, but by the Languedoc Canal, the creation and repair of roads, the diminution of certain feudal burdens, he benefited agriculture and the people generally. He also extended the French marine, Brest, Toulon, Rochefort, &c., dating their importance as naval stations from his rule. In 1663 and 1666 he founded the *Académie des Inscriptions et Belles-Lettres*, the *Académie des Sciences*, and the *Jardin des Plantes*, thus continuing the policy of Richelieu. He had also the happiness of assisting such men as Corneille, Molière, Racine, and Mézerai. Latterly the huge expenses of Louvois' military policy and of the court, and the suspicion the King had of C.'s ambition, oppressed him, and made his position difficult. At last an unjust accusation of jobbery in some fortifications compelled C. to retire, and he shortly afterwards died, 6th September 1683. No man contributed so much to the glory of Louis XIV.'s reign. C.'s brother **Charles** was created Marquis de Croissy; his son, **Jean Baptiste,** who succeeded him in the Marquisate of Seignelay, had something of his father's greatness; another son, **Jacques Nicolas,** became a prelate of the Church; and in the 18th and even 19th c. the family had still some names of mark. See D'Aubigny's *Vie de C.* in the *Hommes Illustres de France*, and Pierre Clément's *Lettres, Instructions, et Memoires de C.* (Par. 9 vols. 1862 *et seq.*), and his *Histoire de C. et de son Administration* (Par. 2 vols. 1875).

Col'chester, a parliamentary and municipal borough in Essex, on the S. bank of the Colne, 51 miles N.E. of London by the

Great Eastern Railway. From its port and suburb, Hythe, the river is navigable to the sea, 15 miles distant, and corn, malt, and oysters are exported. The baize and silk manufactures have much declined. Among its notable public buildings are the Town-hall, the Corn Exchange, the Hospital, and the Asylum for Idiots. Its 'camp' is the second largest in England. C. returns two members to Parliament. Pop. (1871) 26,343. C. is of great antiquity. It is the Roman *Camelodunum*, or *Colonia*; the *Colne-ceaster* of the English conquerors, a favourite stronghold of the Danes, and a place of note in the times of Elizabeth and of the civil war. Roman remains are abundant in the neighbourhood.

Colchester, Charles Abbot, Lord, born at Abingdon, Berkshire, 14th October 1757, and educated at Westminster School, and Christ's Church, Oxford; entered Parliament in 1795, and soon obtained a high reputation as a legal and administrative reformer. He was mainly instrumental in establishing the Royal Record Commission and the Private Bill Office, and in passing the Act for taking a census of the population. C. from 1802 to 1817 was Speaker of the House of Commons, and on his retirement was raised to the peerage as Baron C., with a pension of £4000 a year. He died 8th May 1829. See *Diary and Correspondence of Lord C.* (Lond. 1861).

Col'chicum, the meadow saffron or 'Autumn crocos,' falsely so called, a plant of the natural order *Melanthaceæ*. *C. autumnale* is found wild in many parts of England. The flower expands in the autumn, but the leaves are not fully developed until the ensuing spring. The dried bulbs and seeds are used for the cure or alleviation of gout, though it is only a dubious remedy. They contain a poisonous principle called *Colchicine*, and act upon all secreting organs as a sedative, though rather acrid, and apt to create depression, and in large doses even death. Cattle are not unfrequently injured by eating it. It is believed to have been the basis of the empirical medicine for the gout long famous as *Eau medicinale*, and Dr Royle is of belief that *C. variegatum*, or perhaps *C. bulbocodioides*, furnished the Arabian hermodactyls, at one time considered so potent for soothing pains in the joints.



Colchicum autumnale.

Col'chis, anciently a province of Asia Minor, bounded on the W. by the Pontus Euxinus or Black Sea, on the N. by the Caucasus, on the E. by Iberia, on the S. by Armenia, and coinciding nearly with the modern Russian province of Imerethia and the district of Mingrelia. C. was from the earliest times celebrated for its trade in linen. As the birthplace of Medea, and the scene of the adventures of the Argonauts in quest of the Golden Fleece, it had a dubious reputation among the ancient poets as a seat of sorceries and enchantments.

Cold Cream, a simple ointment, applied as a cooling emollient to inflamed surfaces. An excellent C. C. may be made by melting one part of white wax in four parts of sweet almond oil, then adding gradually three parts of rose water, and stirring the mixture constantly to render it homogeneous.

Colde'nia, a genus of plants of the natural order *Ehretiaceæ*, consisting of shrubs and trees from India and Ceylon. *C. procumbens* is used in India in a powdered state, mixed with the seeds of the fenugreek (*Trigonella Fœnugræcum*), for the purpose of promoting suppuration.

Coldstream, a town of Berwickshire, on the left bank of the Tweed, 15 miles S.W. of Berwick. Pop. (1871) 1724. It was the favourite ford for the passage of the invading English and Scottish armies during war. Later on, from its proximity to England, it became as 'famous' as Gretna Green for its irregular or clandestine marriages.

Coldstream Guards, after the 1st Foot the oldest corps in the British army, one of the three regiments of Foot Guards included in the Household Brigade, and so named from having been raised at Coldstream in 1660 by General Monk. It was at first named 'Monk's Regiment.'

Cole'brooke, Henry Thomas, a great Orientalist, third son of Sir George C., was born at London, June 15, 1765. After residing in France he was appointed, in 1782, to a writership in India, where he became a judge and President of the Board of Revenue. Following in the track of Sir William Jones, he devoted himself to Sanskrit, and in 1797 published a translation of a digest of Indian laws. He laboriously collected and studied ancient Sanskrit MSS., and contributed to the *Researches* of the Calcutta Asiatic Society learned and suggestive essays on the Hindu religion, the Sanskrit language and poetry, the Vedas, &c. He was appointed President of the Royal Asiatic Society of Great Britain in 1820, and died in London, March 18, 1837. C. was a man of wide comprehension, keen critical insight, and deep research. He was one of the first scholars who revealed the riches of the Sanskrit literature to Europeans, and his edition of the *Amara Cosha* (1808) marks an epoch in Sanskrit-English lexicography. He advanced the study of philology not so much by original speculations as by collecting and elucidating Sanskrit works formerly inaccessible to Europeans, on which succeeding researches have been based. Among C.'s other works are a *Sanskrit Dictionary* and *Remarks on the Husbandry and Commerce of Bengal*, in which he advocated free trade with India. His *Miscellaneous Essays* were published in 2 vols. 1837 (new ed. with *Memoir* by his son, 1873). See notice of the life of C. in the *Journal of the Royal Asiatic Society* (August 1838), and Walckenaer's *Notice Historique* in the *Mémoires* of the French Institute.

Colen'so, The Right Rev. John William, D.D., Bishop of Natal, South Africa, was born January 24, 1814; graduated as second wrangler at Cambridge in 1836; was from 1838 to 1842 assistant-master in Harrow; acted as tutor in St John's College, Cambridge, from 1842 to 1846, and was rector of Forncett, St Mary, Norfolk, until his appointment, in 1854, to the bishopric of Natal. For the first part of his *Pentateuch and Book of Joshua* (1862)—a microscopic investigation of Scripture, displaying extraordinary acuteness, combined with an almost morbid eagerness to discover contradictions in the narrative—C. was deposed from his see by the Bishop of Cape Town, but the deposition being declared illegal by the Privy Council, he was afterwards reinstated in his diocese. On revisiting England in 1874, he was forbidden to preach in their dioceses by the Bishops of London, Oxford, and Lincoln. C.'s theological views have created much discussion in England and a schism among the Anglians of the Cape. It cannot be said with justice that any adequate reply has yet been given to his destructive criticism. His works comprise *Miscellaneous Examples in Algebra* (1848); *Plane Trigonometry* (1851); *Village Sermons* (1853); *Ten Weeks in Natal* (1855); *A Translation of the Epistle to the Romans* (1861); *Natal Sermons* (1866); *A Zulu Grammar and Dictionary; A Zulu Translation of the New Testament; The New Bible Commentary by Bishops and other Clergy of the Anglican Church Critically Examined* (1871); six parts of his *Pentateuch and Book of Joshua* (1862-72), and *Lectures on the Pentateuch and the Moabite Stone* (1873).

Coleop'tera, an order of Holometabolic ('complete metamorphosis') insects, represented by the numerous kinds of Beetles, and so named from the front pair of wings being hard and horny, unfitted for flight, but forming *elytræ* or wing-cases for the protection of the hinder pair. The inner margins of the *elytræ* are generally straight, and form a suture when approximated. The mouth is eminently masticatory, and consists of a *labrum* or upper lip, two *mandibles* or biting jaws, two *maxillæ* or lesser jaws, a *labium* or lower lip, and *palpi* or organs of touch appended to the *maxillæ* and *labium*. The hinder wings fold transversely when at rest. Compound eyes are always present. The antennæ or feelers vary widely in form, and are composed generally of eleven joints. The chest consists of a pro-, meso-, and metathorax—three distinct segments. The tarsus consists usually of not more than five joints, but fewer joints may be developed. The larvæ generally consist of thirteen joints, inclusive of the head. The body is soft, the head in the larvæ being horny. The pupa may be enclosed in a cocoon, but its parts are always to be recognised as they lie within the pupa-case. Many variations in the wings and wing-cases exist, and the body is generally invested by a hard covering of *chitinous* or horny material. The order is classified by the number of joints in the tarsi, by the shape and form of the antennæ, and by other salient features.

Coleorhiz'a (Gr. *koleos*, 'sheath,' *rhiza*, 'root'), the cellular sheath which covers the radicle (and afterwards the fibrillæ) of Dicotyledons, as it pierces the lower part of the embryo. See ROOT.

Coleraine' (Irish Gael. *Cuil-rathain*, 'the corner of the ferns,' alluding to an incident in the life of St Patrick), a municipal and parliamentary borough and seaport, county of Londonderry, Ireland, on the right bank of the Bann, 4 miles above its mouth. It is a station on the Londonderry and C. Railway which connects it with Belfast and Dublin. The suburbs of Killowen and Waterside, on the opposite side of the river, are joined to C. by a handsome bridge. C. has manufactures of linen, cotton, soap, leather, and paper, and carries on a large trade in grain, pork, butter, whisky, &c. The salmon fishery on the Bann is one of the most valuable in Ireland. Pop. of parliamentary borough (1871) 6588. C. returns one member to Parliament. Although ships of 200 tons can discharge at the quay of C., the real port of the place is Portrush, 5 miles distant, which has steam communication with Glasgow and Liverpool.

Coleridge, the name of an English family distinguished in literature and law.—**Samuel Taylor C.**, 'logician, metaphysician, bard,' but most memorable as bard, was born on October 21, 1772, at Ottery St Mary, in Devonshire. While yet a child he lost his father, who was vicar of the parish. His education began at Christ's Hospital, where Charles Lamb was his contemporary. He there became proficient in Greek, but according to himself, preferred metaphysics and theology to history and poetry. The work of Mr Bowles (q. v.), however, changed his ideas as regards the last of these. In 1791 C. entered Jesus College, Cambridge, where he devoted his mind to classics, but did not graduate. Debt, his academic failure, and a cross in love, led him to enlist in a dragoon regiment, from which unhappy position his friends procured his release in April 1794, after four months of soldiering. Soon afterwards, at Bristol, he engaged with Southey in a visionary scheme to found a *Pantisocracy*, or ideal communistic settlement in America; but scarcity of funds fortunately arrested this at the outset. Here, also, a volume of poems was published, and in the next year (1795) C. married Miss Fricker, whose sister became the wife of Southey on the same day. He now lived at Nether Stowey, in Somersetshire, while Wordsworth resided at All-Foxden, a neighbouring village. Here C. remained for three years, during which some of his greatest works—*The Ancient Mariner*, *Christabel*, and *Remorse*—were composed. It was at this period that C. preached Unitarianism at Taunton. In 1798 the first edition of the *Lyrical Ballads* by Wordsworth and C. appeared, and in the same year the Wedgewoods gave him the means of visiting Germany. On his return he translated Schiller's *Wallenstein*, which appeared in 1800. C. now resided at Keswick. From 1804 to 1806 he travelled on the Continent, spending the first part of this period in Malta as secretary to the governor. In 1808 he lectured in London on poetry and the fine arts; but from this time till 1816 he was under the mastery of opium. In that year he made a heroic and happily successful effort to break off the habit; and coming then into contact with Mr Gillman, lived in his house at Highgate until he died, after four years confinement to a sick-room, on the 25th of July 1834. During the latter part of his life C. was an orthodox Trinitarian.

C.'s genius was subtle, comprehensive, and eminently original. As a critic, he shows keen insight and exquisite taste. As a philosophic writer, though he embodied no definite scheme and founded no special school, and is at times misty and desultory, he is yet, by his enthusiasm and learning, by the vivifying influence which he exerted over reproductive minds, entitled to be considered, as John Mill said, one of our chief 'seminal' thinkers. His teaching was a strong check to the Benthamism of his day, and his marvellous conversational powers lent him a Socratic influence over many of his youthful contemporaries. Along with De Quincey, he may be regarded as the first interpreter of German thought to Englishmen. His chief prose works are *Statesman's Manual* (1816), *Biographical Sketches* (1817), *Biographia Literaria* (1817), *The Friend* (1818), *Aids to Reflection* (1825), *Constitution of Church and State* (1830). But it is as a poet that his fame is highest and will be most lasting. *The Ancient Mariner* and *Christabel*, in which he introduced the form of lyrical narrative adopted by Byron and Scott, are full of thrilling weirdness and enchanting melody. *Kubla Khan* is a bewitching extravaganza of delicious cadences and dreamy Oriental splendour. His *Ode to France*, *Love*, *Youth and Age*, and other shorter pieces, delight us by their tender sentiment, soft fanciful colour, and unsurpassably rich and sweet music. The *Hymn in the Vale of Chamouni* stands apart from his other works. It is marked by sustained and lofty imagination, by solemn and austere religious sentiment. His dramatic attempts are not part of his characteristic work; they neither add to nor lessen his fame. The latest and best edition of C.'s works is that by Pickering (Lond. 4 vols. 1877). See C.'s *Biographia Literaria*; *Specimens of C.'s Table-Talk*; Cottle's *Early Recollections of S. T. C.*; and Gilman's *Life of S. T. C.*—**Hartley C.**, eldest son of S. T. C., was born in 1796, at Clevedon, near Bristol. His early years gave evidence of great talent, but through his irregular conduct at Oxford University he forfeited the Oriel Scholarship. After some profitless life in London he went to Ambleside, and there remained till his death, 6th January 1849. C.'s sonnets, though admirable, are excelled by his prose works, of which the chief are *Lives of Northern Worthies* and *Life of Massinger*. See *Memoir of Hartley C.* by Derwent C.; also an article in *Macmillan's Magazine*, vol. v. by Lord (formerly Sir J. D.) C.—**The Rev. Derwent C.**, son of S. T. C., was born at Keswick, September 14, 1800. He was educated at Cambridge, served as a tutor in Plymouth, and was from 1841 to 1864 Principal of St Mark's College, Chelsea. He afterwards became rector of Hanwell, Middlesex. He is author of a *Memoir* of his brother, H. C., whose poems and prose remains he edited; of a work on *The Scriptural Character of the English Church*, and of a Life of Winthrop Mackworth Praed. In 1861 he addressed two letters on Education to his cousin the Right Hon. Sir John T. C.—**Henry Nelson C.**, son of S. T. C.'s brother, Colonel C., was born in 1800. He wrote a work entitled *Six Months in the West Indies*, and an *Introduction to the Greek Classic Poets*, but is best known for his *Specimens of the Table-Talk of S. T. C.*, which he published in 1835. He contributed to various periodicals, and died January 26, 1843.—**The Right Hon. Sir John Taylor C.**, nephew of S. T. C., was born at Tiverton, Devon, July 9, 1790. He was educated at Oxford, where he became a fellow of Exeter College, was called to the bar at the Middle Temple in 1819, was appointed sergeant-at-law in 1832, judge of King's Bench in 1835, and privy councillor in 1858. He was made D.C.L. of Oxford in 1852, and was editor of the *Quarterly* after Gifford's death, published an edition of *Blackstone's Commentaries* in 1825, and a *Memoir of Keble* in 1869. He died February 11, 1876.—**Lord C., The Right Hon. John Duke**, son of the above, was born December 3, 1820, educated at Eton and Oxford, and called to the bar at the Middle Temple in 1846. He was made Recorder of Portsmouth in 1858, and a Queen's Counsel in 1861. After contesting Exeter unsuccessfully in 1864, he was elected for that city in 1865; was made Solicitor-General in 1871, and in 1873 was appointed Lord Chief-Justice, and raised to the peerage, with the title of Baron C. of Ottery St Mary's, Devon. He is a man of fine literary as well as legal acquirements, and at one time contributed to various periodicals.

Coleroon', a river of India, the northern branch of the Cauvery, in the Carnatic, and forming through the greater part of its course of 93 miles the boundary between the districts of Trichinopoly and Tanjore. It falls into the Bay of Bengal 120 miles S.S.W. of Madras. From the constant deepening of the bed of the C., and a corresponding rising of that of the Cauvery, the supply of water in the latter river had become inadequate to the proper irrigation of Tanjore. This was remedied by throwing two weirs, locally called *anakatts*, across the C. in 1836.

Cole'seed. See RAPE.

Colet, John, an English scholar and patron of learning, the son of Sir Henry C., a city knight, who had been twice Lord Mayor of London, was born in 1466, studied at Magdalen College, Oxford, and after spending some time in Paris, went to Italy to learn Greek. In 1504 he became Doctor of Divinity, and in 1505 Dean of St Paul's. The death of his father in 1510 gave him the possession of an ample fortune, with part of which he at once began to found St Paul's School. After a generous and enthusiastic career, in which he laboured with equal zeal for the revival of learning and the reformation of religion, he died, 16th September 1519. C. had a thoroughly modern mind. An intense scorn of those mediæval beliefs which constitute the peculiarities of Roman Catholicism animated all his preaching; the picture of Christ drawn by the Evangelists appeared to him the only thing worthy of absolute reverence. It is not sur-

prising that his impatient eloquence alarmed the old-world party, and but for the help of the liberal Archbishop Wareham, he might have suffered persecution as a heretic. Later on, in Henry's reign, C. would certainly not have escaped trouble. Among his published works are a treatise on the sacraments of the Church, and two treatises on the Hierarchies of Dionysius; others exist in MS. at Oxford. See Seebohm's *Oxford Reformers of* 1498, and Green's *Short History of the English People* (1875).

Cole'wort. See BRASSICA.

Col'ibri. See HUMMING-BIRD.

Col'ic (Gr. *kōlikos*, from *kōlon*, 'the large intestine') is a disease the chief symptoms of which are severe griping pains in the belly, especially round the navel, occurring in spasms, and often accompanied by constipation and vomiting. The face has a peculiar anxious expression. Pain may be alleviated by pressure, and hence C. is distinguished from inflammation, in which pressure always aggravates the pain. C. may be due to indigestion, in which case it is generally accompanied by Flatulence (q. v.); to accumulated fæcal matter in the intestines, when relief is obtained by an active purge; or to cold, &c., when opium, chloroform, ether, or belladonna give relief. In all cases poultices or hot fomentations do good. Sometimes C. is caused by working amongst minerals, as copper or lead. Copper C. and lead C. are characterised by the severity of the pain and the length of the spasms; in the former there is a purple line round the gums; in the latter there is a blue line round the gums. In both cases Epsom salts should be given. Lead C. is often called painter's C., because painters are subject to it from working with lead paints.

Colicoden'dron, a tropical American genus of *Capparidaceæ*, all of which have acrid properties. *C. Yeo* of Brazil possesses the acrid principle to such an extent as to be dangerous to horses and mules (Von Martius).

Colign'i or **Colign'y**, the name of a French family, 'seigneurs' of Châtillon-sur-Loing in Burgundy, from whom have come several distinguished men.—**Gaspard de C.**, Marshal of France, was the first who entered the French service after the annexation of Burgundy by Louis XI. He accompanied Charles VIII. on his expedition to Naples, and Louis XII. in his conquest of the Milanese; was created marshal by François I. after the battle of Marignano, and received the governorship of Champagne and Picardy. By his marriage with Louise de Montmorency, daughter of the Constable of France, he greatly increased his influence. C. died 24th August 1522. Of his two sons, one, **Odet de C.** (born 1515, died 1571), became a cardinal at the age of eighteen, but having embraced the doctrines of Calvin, was excommunicated by the Pope. He publicly espoused in his 'red robes' Elisabeth de Hauteville, who was sometimes called, in spite of the ecclesiastical curse, *Madame la Cardinale*. When the civil war broke out, Odet took part in all the strifes with the Guises, but was poisoned by his valet (at whose instigation is not known) after the peace of 1570.—A still more notable person is his younger brother, **Gaspard de C.**, admiral of France, a great soldier, and a leader of the Huguenots, who was born at Châtillon-sur-Loing, 16th February 1517. Entering the army at an early age, he distinguished himself greatly during the reigns of François I. and Henri II. at Cerisales, Carignano, Rentri, and St Quentin, and on other occasions. At first the colleague of Condé, and on his death his successor, in the leadership of the Huguenots, whose doctrines he had embraced from purely conscientious reasons, he fought bravely at the battles of Dreux, Jarnac, and Montcontour, and succeeded in securing an advantageous peace for his party in 1570. After an attempt had been made privately to assassinate him, on the instigation of the Guises, who were jealous of the influence which his powerful mind had acquired over Charles IX., C. perished in the Massacre of St Bartholomew, August 24, 1572. See De la Ponneraye's *Histoire de l'Amiral de C.* (Par. 1830). The family continued to be more or less conspicuous all through the 17th c.

Coli'ma, the capital of a state of the same name in Mexico, with a pop. in 1868 estimated at 31,000. It is in a fertile plain near the volcano of C., which rises 12,003 feet above the level of the sea. Its port, of the same name, 40 miles S.S.W. from the city, has good anchorage, but is little frequented. The *state* of C., one of the Pacific states of Mexico, has an area of 3745 sq. miles and a pop. of 65,827. The coast-line extends 100 miles, and the land, which is in general of low elevation, yields excellent cotton and many tropical products.

Colin. See QUAIL.

Coll, one of the Inner Hebrides, N.W. of Mull, Argyleshire; length about 12¼ miles; greatest breadth 3½ miles; highest summit 326 feet. Pop. (1871) 723, showing a decrease of 56 since 1861. Much of the soil is incapable of cultivation, but some spots are remarkably fertile. The inhabitants neglect the valuable ling fisheries on the coast, leaving them to be prosecuted by fishers from a distance.

Coll'ar-Beam, a piece of timber connecting horizontally opposite rafters, and placed above the level of the feet of the rafter. Also the straining piece of a queen-post truss.

Coll'aring, the neck or cylindrical part of a Doric or Tuscan column.

Collat'eral Secu'rity is, in law, a security besides the main one for payment of a debt or for the discharge of an obligation. Such a security can never be available further than for securing the fulfilment of the principal obligation.

Collateral Success'ion is the succession of the brothers and sisters of the deceased. Formerly in Scotland no representation was allowed in succession to personal (movable) estate; but now the issue of a predeceasing next of kin come in place of their parent in the succession to an intestate, and take the share to which the parent would have been entitled. See BROTHERS, LAW OF SUCCESSION AMONG, SUCCESSION.

Colla'tion, a term of Scotch law. The somewhat analogous one in English law is Hotch-pot (q. v.). C. is a provision of the law of Scotland by which the heritable and movable (real and personal) succession of a deceased person may in certain circumstances be accumulated into one mass, and divided equally among the next of kin. C may take place either between the heir in heritage and the executors, or amongst the younger children. If the heir accept the heritable (real) estate, he has no share in the movable (personal) estate. But he may have his share in both by giving up his exclusive right to, that is collating, the heritage.

Collation to a Benefice is, in England, the act by which a benefice is bestowed. C. comprises presentation and institution.

Coll'e, a town in the province of Siena, Italy, 22 miles S.S.W. of Florence, on the Elsa. It is a bishop's see, has a cathedral and castle, several manufactories, especially paper-mills, and a trade in the corn, wine, oil, and silk produced in the neighbourhood. Pop. 7552.

Collec'tions at Churches. In England C. at C. are at the disposal of the incumbent and churchwardens. Should they disagree as to the distribution, they are to be disposed of as the ordinary shall appoint. (See OFFERTORY.) In Scotland money is still collected at the doors of churches. Formerly one-half of the sum collected by the Established churches was given in support of the poor, the other half was formed into a fund for the temporary relief of sudden distress. Collections at dissenting churches are the property of the congregation. By the present Poor Law Act it is provided that in all parishes in which poors' assessment is levied, the ordinary church collections shall belong to the kirk-sessions, to be applied to no other purposes than those to which they were legally applicable before the date of the Act.

Coll'ects are brief, comprehensive prayers found in all liturgies, and consisting of five parts: invocation, the reason on which the petition is founded, the petition itself, the benefit hoped for, and ascription of praise or mention of the Lord Jesus, or both. They were so called probably because they were originally concluding prayers offered up by the priest alone, in which the previous devotions were all *collected* or summed up, or because in the C. the voices of all the people were collected, as it were, into one, instead of its being said like litanies. See Blunt's *Dict. of Doctr. and Hist. Theology*.

Coll'ege (Lat. *collegium*, a number of persons united by the same office or calling, a corporation or fraternity), in ancient Rome was an association or corporation with a certain constitu-

tion, some of them resembling a modern guild, some being of a religious character, as of the pontiffs, the augurs, &c., and others concerned with government and administration. In modern times a C. is a court or council, as of cardinals, bishops, electors, &c.; a society or corporation banded together for a common object, and for mutual help in the preservation of their privileges, as a C. of physicians, surgeons, &c. C. also means a church inferior to a cathedral, which is served by clergy living in common. The commonest meaning of C., however, in England is that of an academic establishment endowed with revenues, and connected with a university, whose students and teachers live together in particular buildings in a monastic way, and the president of which, with the other officers, teachers, and students, forms a corporation independent of the university. In Scotland C. is more nearly synonymous with university. It is so in the case of those of Glasgow and Edinburgh, and although there are two colleges in the University of Aberdeen, the two are simply united under the same government as one to form the university. In France the C. is a high-school of a superior kind, affiliated and subordinate to the university.

College of Arms. See HERALDS' COLLEGE.

College of Justice. This term has in Scotland been applied to the Supreme Civil Court, composed of the Lords of Council and Session, and of the members and officers of court. The court receives the title of C. of J. in the Act of 1537, and the judges of it were in 1540 termed senators. By the Treaty of Union, no person can be appointed a judge of this court who has not served as an advocate or principal clerk of session for five years, or as a Writer to the Signet (q. v.) for ten years. The judge must be at least twenty-five years of age. The admission is made by the judges in virtue of a letter directed to them by the sovereign. There is a form of trial, but the court has no power to reject the presentee. See SESSION, COURT OF.

Colle'giate Churches were parish churches turned into capitular foundations to accommodate the overflow of canons from some of the cathedrals. They are thus inferior to cathedrals in not having a bishop's throne, although a bishop or even an archbishop was sometimes head of the chapter. See Walcott's *Sacred Archæology*.

Coll'ey, or Collie, the name given to a Scottish shepherd's dog. The origin of the name is not at all clear. Probably it comes from *colly*, 'grimy, black,' or it may have been called after the name of a person, C., its first breeder. The C. is one of the most sagacious of dogs. For shrewdness it is not excelled by the Newfoundland or the St Bernard. It seems to combine the merits of both. It can take the water and retrieve like the former; it can gallop up precipices and descend into crevices after man or sheep with as sure a step, as keen a scent, as undaunted intrepidity and gentle carefulness for the lost, as the latter. The stories told about the acute and accurate knowledge of a C. dog are very numerous—indeed, they surpass those recorded of the St Bernard. Hogg, the Ettrick Shepherd, says that at one time he had several hundred lambs, which he was taking to the fold. They scampered off over the hills in three separate divisions in different directions, defying all efforts to find them. Night came, and the search had to be given up. The dog remained at his task, and in the morning he was found in a gorge standing watch over the whole of the lambs. The C. is an ornamental as well as a useful dog, and is now much sought after in London as a pet. As much as fifty guineas has been refused for one. The general character of the head of the C. resembles that of a fox, the nose pointed, the eye rather small, but full of intelligence, mingled with sagacious craft, the ears half prick, the tips falling over somewhat, neck long and taper, shoulders and brisket deep, back rather short, coat thick and long, tail long, full feathered, and curling well over the back. The backs of the fore-legs should be feathered, the hind ones bare from the hocks, the hips wide and prominent, and the hocks well separated. The colour varies from bluish-grey and tan to lightish grey, from black and white and fawn to black and tan; the latter is now held in most esteem. An absolute necessity to the shepherd, the C. makes also a capital watchdog. Its size varies from about 18 inches to a feet in height.

Coll'ier, Jeremy, a nonjuring divine and polemic, was born 23d September 1650, and studied at Cambridge University; was appointed rector of Ampton in 1679, and chosen lecturer at Gray's Inn in 1685. His life was one long controversy. He was strongly opposed to the Revolution of 1688, writing bitter pamphlets against the Government, and falling foul of Bishop Burnet. For this he was twice imprisoned. The latter portion of his life was occupied with a more useful strife, which he commenced with a pamphlet, entitled *A Short View of the Immorality and Profaneness of the English Stage* (1698). The wits of the day, including Congreve and Farquhar, endeavoured to meet C., but he beat them at their own weapon of satire, and he is generally credited with having aided much in purifying the stage. After a life spent in literary activity, he died, 26th April 1726. Among his other works may be mentioned an *Ecclesiastical History of England*, and a translation of the *Meditations* of Marcus Aurelius, which has been praised by Matthew Arnold.

Collier, John Payne, born in London, 11th January 1789, descended from the celebrated Jeremy C., and for a time law and parliamentary reporter on the staff of the *Morning Chronicle*, is known as one of the chief living commentators on Shakspeare and Shakspeare's contemporaries. In 1831 he published a *History of English Dramatic Poetry to the Time of Shakspeare, and Annals of the Stage to the Restoration.* It was followed in 1835 by *New Facts regarding the Life of Shakspeare.* The work, however, which created the greatest sensation was a volume published in 1853, bearing the title *Notes and Emendations to the Text of Shakspeare's Plays, from Early Manuscript Corrections in a Copy of the Folio of 1632, in the Possession of J. P. C.* The publication of this book caused a prolonged, fierce, and somewhat painful controversy, but the bulk of C.'s emendations seem now to be accepted by Shakspearian editors. Among the later noteworthy works of C. are a *Bibliographical Account of Rare Books* (1865), a series of reprints of the productions of early British poets and pamphleteers, and an edition of Shakspeare, completed in 1875.

Colliers and Salters. The workmen at coal-pits and salt-works in Scotland were formerly under servitude. They became bound, independent of agreement, merely by entering the works, to perpetual service there; and in the event of sale or alienation of the ground in which the works were, the right over the workmen passed to the purchaser without express grant. This slavery was abolished by Act of Parliament 15 Geo. III. c. 28; made more effectual by another Act passed in the thirty-ninth year of the reign of Geo. III. See COAL-MINES REGULATION ACTS.

Collimation, Line of, the straight line which passes through the centre of the object-glass of a telescope and the intersection of the wires placed at the focus. The difference between the actual line and the true axis of symmetry of the telescope is termed the *error of C.*

Coll'ine (Gr. *kolla*, 'glue'), a term applied to gelatine, isinglass, and glue.

Coll'ingwood, Cuthbert, Admiral Lord, an English naval commander, was born at Newcastle-upon-Tyne, September 26, 1750. From the early age of eleven, at which he became a midshipman, he served in the navy, his thorough seamanship, coolness, and courage enabling him to rise rapidly in his profession. He distinguished himself in 1794, when Howe beat the French off Brest, and in the battle of Cape St Vincent in 1797. Finally, at the battle of Trafalgar in 1805, he broke the enemy's line, and completed the victory on the death of Nelson, whose devoted friend and admirer he had been throughout life. He was rewarded with a peerage. C. died at sea, March 7, 1810, lamented by the country and his sailors, who called him their 'father.' His *Despatches and Correspondence* were published by his nephew (Lond. 1828).

Coll'ins, Anthony, a noted freethinker, born at Heston, Middlesex, June 21, 1676, and educated at Eton and Cambridge. He produced various shrewd and acute works, and was the friend of Locke and Le Clerc. C., who led an upright and benevolent life, died 13th December 1729. His chief work is a *Discourse on Freethinking.* He also wrote an *Essay concerning the Use of the Human Understanding* (1707), an *Inquiry concerning Liberty and Necessity* (1715), and a book on the *Grounds and Reasons of the Christian Religion* (1724), all of which provoked vehement controversies in their days.

Collins, William, one of the best English poets of last century, was born 25th December 1721, at Chichester, where his father was a hatter. He was educated at Winchester (where, according to Warton, he wrote his *Persian Eclogues* at the age of seventeen), and at Magdalen College, Oxford. On leaving the university he went to London as a literary adventurer, and passed twelve years in toiling and idling, starving and revelling, framing projects which were never realised, publishing poems which were not favourably received, until the death of an uncle raised him above urgent want. But his sufferings had unfitted him for intellectual effort; he became nervous and partially insane, and died 12th June 1759, in his thirty-ninth year. Hazlitt declared that C. was the only one of the minor poets of whom it could not be said that he might not have done the greatest things. With the exception of Blake, he was the most purely poetic spirit of his century. His *Persian Eclogues* (first published in 1742, and again in 1757 under the title of *Oriental Eclogues*) won the praise of Goldsmith, but have not the glow and splendour of the East. His *Odes* (1746) awoke no response in the public, but they have always been favourites with poetic minds. Nothing more delicately imaginative, pensive, and musical, rich in colour and choice in diction, was produced in the 18th c. That on *The Passions* is unsurpassed for bold and vivid personification, and exquisite changes of melody; while the *Ode to Evening* is one of the sweetest, airiest pieces in the language. Every word is faultless, every tone is true. See Moy Thomas's Memoir, prefixed to the Aldine edition of C.'s works (Bell & Daldy, 1858).

Collins, William, R.A., born in London, 18th September 1787, first exhibited at the Royal Academy in 1807, and was elected Associate in 1814, and R.A. in 1820. After the death of his father in 1812 he found himself obliged to paint portraits, though the special branch of art in which, in the earlier part of his life, he took most delight, was landscape, with rustic or homely figures. In 1814, however, he commenced to paint coast scenery, and following this path, arrived at fame and fortune. C. died in London, 17th February 1847. Among his works, which excel in truth of form, chiaroscuro, and colour, probably the best-known are, 'Happy as a King' (1836), 'The Shrimpers—Evening' (1831), and the 'Fisherman's Widow' (1835). See his *Biography* (2 vols. Lond. 1848), written by his son, **William Wilkie C.**, who has attained high distinction as a novelist. He was born in London, January 1824, and intended for a commercial career, but turned aside to literature, commencing with the biography of his father. Among his earlier fictions are *Antonina* (1850) and *Basil* (1852). C. became a fellow-worker with Dickens in *Household Words*, in which appeared *After Dark* (1856) and *The Dead Secret* (1857). An immense accession to C.'s popularity was given by his *Woman in White* (1859-60). Since then he may be considered to hold a leading place among English novelists. Later productions are *The Moonstone* (1868), *Man and Wife* (1870), *The New Magdalen* (1873), and *The Law and the Lady* (1875). Several of these have been dramatised. All C.'s works are remarkable for vivid portraiture, startling incident, and a surprising intricacy of plot, which at once perplexes and captivates the reader.

Collis'ion of Vessels. To prevent collisions of vessels, steering and sailing rules have been laid down by the Merchant and Shipping Amendment (1862) Act. Where loss arises from pure accident, or Act of God (q. v.), as it is termed, the loss falls where it lights; when there has probably been fault, but no one can say who has been chiefly to blame, the loss is divided equally, or in proportion to the respective value of the ships. If the fault be clearly on one side, the owners of the ship in fault are answerable for damage. A steam-vessel is bound to keep out of the way of a sailing-vessel.

Collo'dion (formed from the Gr. *kollaō*, 'I stick') is a solution of a particular kind of *gun-cotton* (see CELLULOSE and GUN-COTTON) in a mixture of alcohol and ether, and is largely employed in photography and surgery. C. was discovered by Maynard, a physician of Boston. The best kind of gun-cotton for C. is prepared by soaking 1 part of cotton-wool in a cooled mixture of 16 parts of nitre, 12 parts of fuming sulphuric acid (Nordhausen vitriol), and 12 parts of ordinary oil of vitriol. The wool should be stirred about in the mixture for five minutes, then washed for a long time in a current of cold water, squeezed, and allowed to dry in the air. To prepare C., 1 part of the gun-cotton is shaken in a bottle with 16 parts of ether; after some time 1–2 parts of absolute alcohol are added, and the mixture agitated till the wool disappears. The C. thus obtained should be filtered. C. is a clear, colourless, and more or less mucilaginous liquid. Its uses depend upon the fact that when spread over a surface and allowed to dry, a tenacious film is left, which adheres closely to the material on which the C. has been spread. Thus a wound or raw surface, if painted with C., becomes covered with an artificial skin, which completely protects it from the air. For surgical purposes *flexible C.* is employed. This consists of a mixture of 6 fluid ounces of C., 120 grains of Canada balsam, and 1 fluid drachm of castor-oil. C. is also employed in making small balloons, and to protect caustic substances, &c., from the air.

Collodionised Paper Process, a photographic process, invented by Mr Corbin, which consists in employing negative paper coated with gelatine as a support for the excited collodionised film, which is preserved by a thin layer of albumen and honey. To render the film sensitive it is immersed in a bath of acetonitrate of silver, after which it is washed and dried. Immersion in a solution of gallic acid to which a few drops of acetonitrate of silver have been added develops the picture.

Coll'ot d'Herbois, Jean Marie, one of the most sanguinary and ignoble characters of the French Revolution, was born at Paris in 1750. He was at first an actor and dramatist, but became prominent at the time of the Revolution, distinguishing himself as one of the most violent of the Jacobins—his sentiments being generally much 'exalted' by liquor, of which he was ludicrously fond. Sent (1793) by the Convention to Lyons after its surrender, he committed the most fearful atrocities, 1600 persons being, at his orders, destroyed by grapeshot or the guillotine. He contributed to the fall of Robespierre, but was nevertheless transported to Cayenne, where he died of fever, 8th January 1796. The *Nouvelle Biographie Générale* gives a long list of C.'s comedies, which once, it seems, had some success, though they are now only remembered by the infamy of their author.

Collu'sion is a deceitful or fraudulent agreement between two or more persons to defraud some one of his right. When proved, it has the effect at common law of making void any transaction in which it occurs. Instances of C. frequently occur in arrangements between bankrupts and their creditors; and as the proof in such cases is often difficult, our bankrupt statutes have created certain legal presumptions of C. in cases of bankruptcy.

Col'man, George, the elder of two dramatists of the name (1733–94), was born at Florence. He was an industrious and successful writer, composing or adapting more than thirty plays, besides writing poems and publishing translations. He was for a time acting manager of Covent Garden Theatre, and subsequently purchased the Haymarket. Of his pieces, the *Jealous Wife* shows perhaps the most ability. His son, commonly known as 'the Younger' (1762–1836), educated at Westminster School, Christ's College, Oxford, and King's College, Aberdeen, was also an indefatigable writer of dramas, receiving large sums for many of them, one or two of which are still occasionally acted. He also managed the Haymarket Theatre, and for a time was Examiner of Plays. His latest work was a memoir of his life, which was published under the title of *Random Records* (Lond. 1830).

Col'mar, or **Kolmar**, formerly the capital of the French department of Haut-Rhin, fell to Germany in 1870, and is now the capital of Ober-Elsass. Pop. (1871) 23,311. It stands on a plain at the confluence of the Lauch and Fecht, about 2 miles from the foot of the Vosges Mountains, and is a station on the Strasburg and Mulhouse Railway. The most remarkable buildings are the cathedral (1363), Hôtel-de-ville, and the college, which contains some pictures by Albert Dürer. It has a public library of 60,000 vols. Its chief manufactures are linens, calicoes, woollens, silks, paper, hosiery, and leather, and it is the entrepôt for cotton, iron, wine, and colonial produce for Switzerland. Under the Franks, C. was a royal court, called *Columbaria*, round which the town grew up. The Emperor Friedrich II. gave it municipal rights in 1226, and it was afterwards a free imperial city. Its fortifications, erected in 1552, were dismantled by Louis XIV. in 1673. The peace of Ryswick

(1697) united it to France, in whose possession it remained till 1870.

Colne, a market-town in Lancashire, 32 miles N.E. of Manchester, on C. Water, a tributary of the Calder, and at the junction of the Midland Railway with the Lancashire and Yorkshire line. Mousselines-de-laine and calicoes are manufactured, and in the vicinity coal, slate, and lime abound. Archbishop Tillotson received the rudiments of his education at the grammar-school of C. Pop. (1871) 7335.

Col'obus, a genus of Old World or Catarhine monkeys, in which alone, of all Catarhina, the thumbs are absent or at most very rudimentary. This genus is allied to *Semnopithecus*, and the *C. Ursinus*, *C. Satanas*, and *C. Guereza* are familiar species. These monkeys exclusively inhabit Africa. See also MONKEY.

Col'ocynth, a medicinal substance consisting of the dried pulp of the bitter cucumber, *Citrullus Colocynthi*, a plant which is a native of the S. of Europe, and bears some resemblance to the common water-melon. C. is a light spongy yellowish-white substance, intensely bitter, and about the size of a small orange. It is imported chiefly from Smyrna, Trieste, France, and Spain. In doses of 2 to 8 grains it acts as a powerful cathartic, producing copious watery stools. C. is apt to cause griping, which, however, may be prevented by combining it with henbane or belladonna. Its active principle is *Colocynthin*, $C_{56}H_{84}O_{23}$.

Cologne', the French form of the German KÖLN (q. v.).

Cologne Yellow, used for lacquering, and generally as an oil or water colour, is a mixture of chromate and sulphate of lead with sulphate of calcium.

Colomba'no, San, a town of N. Italy, province of Milan, in a hilly district 9 miles S. of Lodi. In the vicinity are found felspar, red granite, and limestone. Pop. about 6000.

Colom'bia, United States of, formerly **New Granada**, a federal republic of S. America, is bounded N. by the Caribbean Sea, S. by Ecuador and Brazil, E. by Venezuela, and W. by the Pacific. Area, 455,673 sq. miles; pop. (1871) 2,916,703. It is divided into nine states—Antioquia, Bolivar, Boyaca, Cauca, Cundinamarca, Magdalena, Panama, Santander, Tolima. In the W. it is traversed by the great triple range of the Andes, alternating with lofty plateaux, while in the E. and S.E. it is spread out in magnificent *llanos*, covered with dense forests, and forming the basin of the upper waters of the Orinoco and Rio del Negro. Its great river is the Magdalena, which flows throughout the state from N. to S., receives the Cauca and many smaller tributaries, and enters the Caribbean Sea after a course of 900 miles. There is every variety of climate, from the tropical heat of the coasts to the intense cold of the region of perpetual snow. Of the products, which are rich and various, the chief are tobacco (Ambalema and Palmira), sugar, coffee, mahogany, cinchona bark, ipecacuanha, &c. But its mineral wealth is still more important, consisting of gold, platina, silver, copper, coal, amber, &c. In 1874 the total exports amounted to 9,895,060 dollars. England receives most of the precious metals, and Germany nearly all the tobacco. The value of the imports in 1874 was 11,218,840 dollars. Besides the railway across the isthmus of Panama (q. v.), there is a short line between Sabanilla, on the coast, and Barranquilla, where the navigation of the Magdalena begins. The Magdalena is ascended by regular lines of steam-vessels for some 800 miles. Among the industries, which are all somewhat primitive, the chief are agriculture, cattle-breeding, and mining. Antioquia is the great mining state, and yet has only one mine (Zancudo) supplied with good modern machinery. In all there are (1876) 561 mines, employing 16,000 men, and producing gold and silver to the value of 2,300,000 dollars yearly. The capital is Bogota. The inhabitants of the interior are mostly Indians, while the total number of white men does not greatly exceed one million. The Columbians are Roman Catholics, but no form of religion is protected by law. In spite of the opposition of the Catholic clergy, a state system of education has been established, and in 1874 there were 1845 schools and 83,626 pupils. The press is free, and Government has abolished the penalty of death for crime. Each state of the republic is 'sovereign and independent,' and sends three senators to Congress, and one representative to the Lower House for every 50,000 inhabitants. The army consists merely of some 1000 men.

The country, originally occupied by a semi-civilised tribe, called *Chibchas* or *Muyscas*, was conquered by Ximenes de Quesado (1536–37), and in 1718 was formed into a Spanish viceroyalty, comprising the districts Panama, Bogota, and Quito. In 1819 it became independent of Spain, and was formed into a republic along with Venezuela and Equador. This union was dissolved, however, in 1829–30, and C. was converted into a separate republic in 1833. After several 'revolutions,' the constitution was finally remodelled, and the country received its present name on the 20th September 1861. See Powles, *New Granada, its Internal Resources* (Lond. 1863); Mosquera, *Compendio de Geografia, General Politica, Fisica, y Special dos Statos Unidos de C.* (Lond. 1866).

Colom'bo, a Portuguese corruption of *Kalambu*, itself an Arabic corruption of the Cingalese *Kalan-totta*; the 'Kalany ferry') is the capital of Ceylon, on the S.W. coast of the island, near the mouth of the Kalany-ganga, on a spit of land protected by a fort mounted with 300 cannon. It is the residence of the English governor, the seat of a colonial bishop, and has a pop. (1871) of 100,238, of whom less than 6000 are Europeans, the remainder consisting of a motley mass of Cingalese, Malays, Malabarese, Arabs, Chinese, Parsees, and other Easterns. Among the more notable buildings are the cathedral, and other Christian churches, Protestant and Catholic, a Mohammedan mosque, a military hospital, and an orphanage. The houses, both of the Europeans and natives, are so hidden in clumps of cocoa-palms, and other tropical trees that the town presents the appearance of a forest. C. may be divided into the European or White Town in the neighbourhood of the fort, and the *Pettah* or Black Town, in which most of the magazines and warehouses are situated. The esplanade of Galle-Face forms the public park of the city. C. was formerly the chief station for steamships in Ceylon, but they now mostly resort to the flourishing port of Point-de-Galle. C. possesses a European society of considerable culture. A new museum is nearly completed, which will contain an Oriental and general library, and a museum of natural history and antiquities. Grants have been made for its endowment from the colonial revenues. C. is connected with Kandy, in the centre of the island, by a railway 75 miles long.

Co'lon. See PUNCTUATION.

Colon, a portion of the great intestine. See INTESTINE.

Colonel (Fr. from the Ital. *colonnello*, a dim. of *colonna*, 'a column;' or, according to others, but with less probability, it is Lat. *coronalis*, from *corona*, 'a crown'), in the British army, is the highest officer attached to a regiment. Except in the Engineers and Artillery, the office is a sinecure, bestowed, presumably, as a reward for long service. Besides the regimental rank of C., there is the rank of brevet-C., through which every officer must pass before he becomes a general officer. See BREVET, GENERAL OFFICER.

Colo'nia do Santiss'imo Sacramen'to, a strong seaport of Uruguay (Banda Oriental), on the N. bank of the Plata, opposite Buenos-Ayres. In 1845 the combined English and French fleets retook it from Rosas, then Dictator of Buenos Ayres, to keep the navigation of the upper part of the river free. Pop. about 7000.

Colo'nial Corps were certain regiments forming part of the regular British army, but devoted to the service of the colonies. As the colonies became self-ruling, it came to be considered contrary to imperial interest to keep up forces not available for general imperial purposes. The C. C. have accordingly been disbanded, except the Malta Fencibles and two West Indian regiments.

Col'onies, Laws of England regarding. All persons charged in any colony with an offence committed on the sea, may be dealt with as if the offence had been committed within the jurisdiction of the colonial court, and shall receive the same punishment as would have followed on conviction in England. The term *colony* includes all possessions abroad in which there is a legislature, except the Channel Islands and the Isle of Man. Colonial law is void if contrary to Act of the Imperial Parliament; but mere inconsistency with instructions from the Home Government will not make it void. Since 2d August 1858, all powers previously exercised by the Board of Control and by

the East India Company over the territories and revenues of India, have been exercised by the Secretary of State and Council for India. See INDIA, BRITISH.

Colonn'a, an illustrious Roman family, which takes its name from a small village on the Alban Hills in the province of Latium, now belonging to the Rospigliosi-Pallavicini family. It traces its origin to the Counts of Tusculum, who in the 10th and 11th centuries enjoyed the highest estimation at Rome, but it first came forward independently about the close of the 11th c., and from that time till far on in the 16th it played a part surpassed in distinction by no Roman family except its hereditary rival and foe—the Orsini. By numerous fortresses, built all along the Alban and Sabine Hills to the very borders of Naples, it became repeatedly a source of terror, both to the Popes and to the Roman people, while it was perpetually mixing itself up in the bloody feuds of the age. Usually the Colonni figure as the heads of the Ghibelline party, but occasionally they are also found on the side of the Guelphs. The sons of Giovanni C. (who about 1278 was a Roman senator, and in 1288 Marchese of Ancona), **Stefano** and **Agapito**, were the founders of the two still flourishing lines of the C. family, that of *Palestrina* (now represented by the branches of C. di Sciarra, and Barberini-C.), and that of *Paliano*, usually called the line of the Grand Constable, with which is joined the subordinate branch *C.-Stigliano* in Naples. Pope Martin V. (**Oddone C.**), with numerous cardinals, generals, statesmen, scholars, and authors, belong to it, whose names are conspicuous in the ecclesiastical, political, and literary history of Italy. We can only notice here **Vittoria C.**, the most famous poetess of Italy, who was the daughter of Fabrizio C., Grand Constable of Naples, and was born at Marino in 1490. In 1507 she was married to Ferrante d'Avalos, who soon after came to his father's title—Marchese de Pescara—and who died in 1525 of wounds received in the battle of Pavia. Overwhelmed with grief, the young widow sought consolation in solitude, in study, and in religion. She occupied herself with poetical composition, and her verse, which in her early widowhood musically bewailed her lost husband, drew its inspiration in later years from elevated religious feeling. Her poems, the best edition of which was published (with a memoir) at Rome (1840) by Ercole Visconti, are perhaps too faithfully modelled on the style of Petrarch, but evince an exquisite talent and genuine sentiment. Her beauty and talents, which are said to have attracted the affectionate regard of Michael Angelo, are celebrated by Ariosto in the 37th canto of his *Furioso*. It may here be noted that the C. Palace in Rome, at the base of the Quirinal, is world-celebrated for its gallery of art and its magnificent gardens. See Coppi's *Memorie Colonnesi* (Rome, 1855).

Colonna, Capo (anc. *Sunium Promontorium*, Byron's 'Sunium's marbled steep'), a headland of Greece, the most southerly point of Attica, rising almost perpendicularly from the sea to the height of 269 feet. Sixteen columns of white marble, the remains of a temple of Minerva, crown the steep and give it its name.

Colonnade', a series of columns, placed at intervals, and arranged according to the rules of art, and of the particular order to which they belong.

Col'onsay ('the island of Columba'), one of the Inner Hebrides, W. of Jura, between Mull on the N. and Islay on the S. Separated from it by a narrow channel to the S., of not more than 100 yards wide, and dry at low water, is the isle of Oronsay. Together they are 12 miles long, with a breadth of from 1 to 3 miles. Potatoes and barley are grown, and black cattle and sheep of a superior breed are fed on the pastures. Oronsay contains the fine ruins of a priory, founded by the Lord of the Isles. Pop. of both islands in 1871, 456, being a decrease of 142 since 1861.

Col'ony has been applied to a great variety of settlements. The limited space possessed by the states of ancient Greece suggested the Doric colonies of Italy and Sicily, and the Ionic and Æolic colonies of Asia Minor. This was voluntary emigration of persons who proposed to form themselves into a self-supporting society, and who therefore seldom retained any connection (except that of a common religion) with the mother country. Their origin was, however, frequently appealed to for a temporary political purpose, and they were liable to be involved in the wars between the democratic and the aristocratic parties in Greece. The Greek term *apoikia*, or 'departure from home,' is therefore different in meaning from the Latin *colonia*, 'plantation of tenant-farmers,' which was made necessary by the disuse of the agrarian law. The latter were chiefly in the conquered provinces of Italy; they were accompanied by the *augur* and the *agrimensor* (who overthrew the ancient and consecrated the new boundaries): they had duumvirs, quinquennials, and decurions, in imitation of the consuls, censors, and prætors of Rome; these magistrates regulated local affairs, but political sovereignty remained at Rome. The C. was regarded by the better class of plebeians as an exile, as a renunciation of the Roman for a municipal franchise, and the state regarded it as a nursery for soldiers. Fifty such colonies were founded in Central Italy before the second Punic War, and at least twenty more from B.C. 197 to B.C. 177 in Italian Gaul, Campania, Apulia, &c. Some of these colonies were purely military, and had an ensign on their coinage; others were purely civil, *C. togatæ*, and had a plough on their coinage. The Roman C. differed from the *municipium* in this, that the former was entirely governed by Roman, the latter frequently by local law and custom. Modern examples of the military C. are Gibraltar, Aden, Malta, and St Helena. Carthage introduced a different system of colonisation in the commercial factories which she planted round the Mediterranean, and which were imitated in the French and Dutch settlements in the East. The modern policy, however, as in the Spanish colonies of S. America, and in the African and Eastern colonies of Portugal, was to conquer the native race, and keep them down by a strong government, the members of which were taken from the home country. After the Seven Years' War (1763), England gradually took the place of France in Eastern colonisation. The English C., *par excellence*, was, however, a private adventure, as in Raleigh's Virginia, or a movement of conscience, as when the Pilgrim Fathers sailed for New England. The question of the supreme power of the mother country, which had been speculatively raised by Molyneux with regard to the Irish woollen trade, was strikingly illustrated by the failure of the directors of the Indian and African Company to give coherence or permanence to the Darien expedition. That company had, by Act of Parliament, power to make colonies, to defend commerce, and to make reprisals when attacked. Nevertheless, it was found necessary to declare war against Spain, and, of course, the unassisted C. was destroyed. But the political doctrine of trade reciprocity was a stronger link between the colonies and the mother country than even the feeling of allegiance. It was held, even in the time of Adam Smith, that it was important to bind the colonies to buy the manufactures of the mother country, while the latter gave the colonies a preferential market for raw produce. This monopoly was no doubt advantageous to the colonial capitalist, who flourished at the expense of the British consumer. The practice of restraining manufactures in the colonies is curiously counterbalanced by the modern protectionism of colonies, who find it impossible to compete with the free trade of the mother country. Most of the British colonies have rights of parliamentary representation, of debate, and of legislation, of determining the sources of public revenue and expenditure, of enacting laws for the security and control of property, for the repression of crime, &c. They have also right to all the land of the C. not granted to private owners. Theoretically, the acts of a colonial legislature are liable to the revision, and even the rejection, of the Home Colonial Office; this was recently exemplified in the question of marriage with a deceased wife's sister. Appeals from the colonial courts are taken to the Judicial Committee of the Privy Council. The C. is however disabled from such acts of independent sovereignty as the initiative in war, alliances, and diplomacy generally. Colonists are British subjects, and are treated as such by British consuls, although the colonies pay nothing for the consular service. After the doctrine of the complete sovereignty of the mother country had been abandoned, the doctrine of tutelage, advanced by Lord Grey in defending Lord John Russell's colonial policy, was adopted. This led to Kaffir and Maori wars, to the colonial endowments of the Episcopal Church, and the clergy reserve in Canada. Great Britain still expends £3,620,093 per annum on her colonies, including Heligoland, Bermuda, the Falkland Islands, and the Straits Settlement, and the military posts. For the future, it seems probable that the cost of native

wars will be thrown [illegible] and that the duty of international [illegible] will remain.

Col'ophon, anciently an Ionian city of Asia, on the river Hales, 8 miles N. of Ephesus, was of little historical note, though its trade in resin is mentioned by Pliny. Mimnermus, the elegiac poet, was a native of C., and it claimed to be the birthplace of Homer. The Greek proverb, 'He has put the C., *i.e.*, the finishing stroke, to it,' has probably no reference to the city, though Strabo says it originated in the fact that victory was assured to the party on whose side the famed Colophonian cavalry charged. The C., or inscription at the end of old printed books, contained the printer's name and the date and place of printing.

Coloph'ony. See ROSIN

Colora'do (Span. 'red'), the name of two rivers in the U.S.; one rises in the Rocky Mountains, and, after a course of 1200 miles, flows into the Gulf of California; the other rises in the interior of Texas, and, after a course of 800 miles, flows into the Gulf of Mexico.

Colora'do, one of the United States of N. America, is situated among the Rocky Mountains. It is bounded by Wyoming on the N., Kansas and Nebraska on the E., New Mexico on the S., and Utah on the W., and has an area of 104,500 sq. miles. The chief rivers are the Rio Grande del Norte and the Arkansas. Pike's Peak is 11,497 feet above the sea. The discovery of gold in 1857 led to its settlement. The mineral resources of C. are immense, including not only gold, but silver mines of great value, also gypsum, coal, iron, and salt. In 1870 the yield of minerals amounted to $5,500,000, and real and personal property was valued at $20,243,303. In 1875 the amount of gold and silver taken from the mines amounted to $6,299,817. In the same year there were in operation 735 miles of railway. C. was admitted as a 'state' in 1876. Pop. in 1870: whites, 39,[illegible]; blacks, 456; Chinese, 7; Indians, 7480. Pop. in 1875, about [illegible]. The state capital is Denver; other towns are Golden City, Mountain City, and Central City.

Colora'do Bee'tle (*Doryphorus decemlineatus*), a genus of beetles noted for effecting great destruction in potato-fields, and which has committed great ravages in America. All efforts to check this pest have been unavailing, the plants speedily succumbing to the attack of these insects, which appear frequently in great numbers. See POTATO.

Colorim'eter, an apparatus of great value in the art of dyeing for ascertaining the strength of dye-stuffs. A known weight of the colouring matter to be tested is suitably dissolved, and the colour it produces compared with a standard solution. The colorimetric test is generally applied by the intensity of colour produced by an ascertained depth of the solutions in two different graduated test-tubes.

Colossæ, a city of ancient Phrygia, on the Lycos, now the *Ak-su*, a tributary of the Mæander. Its people were famed for their skill in dyeing wool, but what Strabo means by *Collosseandyed* is now unknown. C. was one of the early Churches of Asia, and to its members Paul addressed an epistle.

Colosse'um. See AMPHITHEATRE.

Colos'sus, a Greek word whose origin is not known, signified a [illegible] than life, but was more frequently applied to those [illegible] large figures which were so famous in Egyptian, Greek, and Roman art. The most celebrated Egyptian C. was the [illegible] statue of Memnon, in the plain of Thebes. Among the colossi of Greece the most celebrated was the bronze statue of the Sun by Chares of Lindus, which all agree to have been upwards of 100 English feet high, and which stood at the entrance of the harbour of Rhodes, though there is no authority for the statement that it did 'bestride' the harbour mouth. This, like the statue of Memnon, mentioned above, was one of the Seven Wonders of the ancient world. Among the famous colossi of Phidias were the ivory and gold statues of Zeus at Olympia, and of Athene in the Parthenon, and the bronze statue of the latter on the Acropolis, the point of whose spear and the crest of whose helmet were seen by sailors from the point of Sunium. At Rome, the most famous colossi were the statue of Jupiter on the Capitol, the bronze statue of Apollo at the Palatine Library, and the statue of Nero, which gave to the adjoining amphitheatre the name of *Colosseum*.

Colos'trum, the first milk of mammalia, distinguished from ordinary milk by its yellowish colour and greater thickness, due to a large proportion of fatty principles, casein, milk-sugar, and solid constituents. See MILK.

Colour, in art, means that combination or modification of tints which is specially suited to produce a particular and desired effect in painting. Among the old masters, the greatest colourists either belonged to the Venetian school, founded by Giorgione at the close of the 15th c., or were the pupils and imitators of the leaders of that school. Titian, Correggio, Paul Veronese, and Rubens are recognised generally as the greatest colourists. The excellence of C. lies, in part at least, in the subtle harmony which is seen to exist between it and the action or suggested meaning of the picture. *Local Colours* are the natural hues of objects arranged in special localities of a picture for the purpose of producing a desired picturesque effect. *Positive Colours* are the natural hues of objects unaffected by any modification, as that of distance, reflected light, or the neighbourhood of colours that weaken or otherwise affect them. *Neutral Colours* are those the natural force of which is modified or broken by the reflected colours of surrounding objects.

Colour, in optics. See CHROMATICS, LIGHT, SPECTRUM ANALYSIS.

Colour, a rhetorical term which has become technical in English law. It was the rule in pleading in Confession and Avoidance (q. v.) to admit some apparent right requiring to be met by the allegation of new matter. This was called giving C. to the plaintiff's claim. The form has been set aside by the Common Law Procedure Act (1852).

Colour-Blindness is a peculiar affection consisting of an inability to distinguish one colour from another. It is often termed *Daltonism*, after the celebrated philosopher Dalton, who was subject to this affection. The most common variety of it is that in which the person cannot distinguish red from green. Poppies among green corn, or ripe fruit on a cherry-tree, have to them the same hue. Others can only distinguish black, white, and grey (which is really a mixture of black and white), and to them nature presents neutral tints only. It is said to be more common in the male than in the female. A harmless defect in most persons, it may be very serious in others, as in pointsmen, railway guards, engine-drivers, or sailors, who have to know the meaning of signals made by coloured lights. The cause of C.-B. is not known. Three theories have been advanced: (1) That it is a defect of the structure of the retina of the eye; (2) that it is a peculiarity in the absorptive power of some of the fluids or transparent media of the eye; and (3) that the defect is in the sensorial centre in the brain. See EYE.

Colour-Printing. See POLYCHROME PRINTING.

Colour-Sergeant is a rank in the army usually given to deserving soldiers. The C.-S. ranks above the ordinary sergeant. The pay is 2s. 5d. per day.

Co'lours, Metals, and **Furs,** are the three tinctures in Heraldry (q. v.). The metals, which are *or*, gold, and *argent*, silver, represent yellow and white, and always take precedence of the C., unless the contrary is specified. The five C. are *azure*, blue; *gules*, red; *sable*, black; *vert*, green; and *purpure*, purple; their abbreviations being az., gu., sa., vert, purp. *Tenne* or *tawny*, an orange colour, and *murrey* or *sanguine*, a dark crimson, are sometimes used, but very seldom now in English heraldry. In French heraldry vert is called *sinople*. C. and metals, when engraved, are represented by a very convenient system of dots and lines: *or*, by dots; *argent*, is left plain; *az.*, is indicated by horizontal lines; *gu.*, by vertical lines; *sa.*, by horizontal and vertical lines, like a small check; *vert*, by diagonal lines from dexter to sinister, or heraldic right to left; and *purp.* the reverse of the latter. *Tenne* is represented by vertical lines down through those of *purp.*; and *murrey* or *sanguine* by diagonal lines from both dexter and sinister, crossing each other.

Colours, Military, are the standards and other flags carried by a regiment. They are sentimentally regarded as symbolical of the achievements and renown of the regiment, and as forming an important part of 'the pomp and circumstance of glorious

war:' accordingly in battle, when defeat has been inevitable, brave soldiers have been often known to wrap their C. round them, and to die in their defence—

> 'One sleeps where southern vines are dressed
> Above the noble slain;
> He wrapt his colours round his breast
> On a blood-red field of Spain.'

The presentation of C. to a regiment by a lady is a graceful ceremony that always evokes a generous and loyal emotion.

Colt, Samuel, inventor of the C. revolver, was born in Hartford, Connecticut, U.S., July 19, 1814, and in early life was successively a sailor and a 'lecturer.' In 1835 he took out a patent for the invention which gave him fame and wealth. In 1837 his revolver was used successfully in the Florida war, and still later in the Mexican war. C. erected large works in Hartford, on the banks of the Connecticut river, reclaiming a great deal of waste land for this purpose. He died January 10, 1862.

Colts'foot. (See TUSSILAGO.) Sweet C. is the American name for *Nardosma*. West Indian C. is *Pothomorpha*.

Colubri'na, one of the chief divisions of the order *Ophidia* (q. v.) or Serpents (q. v.), distinguished by the fact that all its members possess solid teeth in the upper jaw, in addition to the poison-fangs with which that jaw may be provided. The fangs, when present, are immovably fixed in the mouth, and they may be deeply grooved, but never form completely hollowed or 'canaliculated' organs. The head gradually tapers off into the neck, and is not markedly triangular. It is covered by large-sized scales or *scuta*. The C. are divided into the three sections, *Innocua*, or harmless snakes; *Suspecta*; and *Venenosa*, or venomous forms. The *Innocua* possess no fangs or poison-gland, solid teeth existing in both jaws. Of this group the Boas and Pythons (q. v.), and the genus *Coluber*, represented by the common ringed or British snake (*C. natrix*), are good specimens. This latter snake, found in Britain and Europe, inhabits mossy places generally, averages 3 feet in length, and is coloured pale olive, spotted with black above and whitish beneath. The neck is spotted yellow. The *Coluber Elaphis* of S. Europe, the *C. Æsculapii*, or Æsculapian snake of Italy, the *C.*, or *Bascanion constrictor* or black snake of America, are also examples of the same genus. The section *Suspecta* includes snakes with fangs placed far back in the upper jaw, and having solid teeth *in front* of them. These are all Old World snakes (*Homolopsidæ*), &c., and but little is known of their habits. The Colubrine *Venenosa* have fangs in front of the upper jaw, with solid teeth *behind* them. To this group belong the Cobras (q. v.) or *Naja*, the *Hydrophidæ*, or water-snakes of the E. Indies, and many others. As implied by the name *Venenosa*, they are all particularly venomous.

Colu'go. See FLYING LEMUR.

Colum'ba, St, the apostle of the Scottish Highlands, was born at Gartan in Donegal, on the 7th December 521. Fedhlimidh, his father, was of the Cinel Connal, a branch of whom, the Hy Neills, gave several kings to the N. of Ireland. His mother, Eithne (*Aine*), was of the royal race of Leinster. He thus possessed the advantage, especially valuable among a Celtic people, of royal lineage. His uncle was King of Ulster, and he was related to the kings of Dalriada in Argyleshire, his adopted country. He was baptized *Colum*, and was subsequently, from his Christian zeal, called *Colum Cille—i.e.*, 'Colum of the Church.' He began his education at Movile (*Magh-bile*, 'the plain of the large tree'), under the celebrated bishop St Finnian, who ordained him as deacon. After studying some time in Leinster under an aged bard, Gemman, he entered the monasteries of Clonard and of Glasnaoidhein (Glas Nevin) near Dublin, whence he returned to his native N. When twenty-five years of age he founded the Church of Derry in Ulster (*Daire*, 'oak copse,'—the foundation of the since famous Londonderry), and about seven years later founded the monastery of Durrow (*Daire-magh*, 'the oak copse of the plain or field'). He planted various other churches from this period to the year 561, when an event occurred which was the great crisis in his life. Various accounts are given of the matter, but the following is the best authenticated:—C. copied a psalter belonging to Finnian without asking the owner's permission. (This transcript afterwards became famous as the *Cathach*, and is said to be still preserved by the O'Donnels as a very valuable relic.) Finnian claimed the copy as his property; C. refused to give it up, and the matter was referred to Diarmat, King of Connaught, who, on the principle that every *cows* (calf) belongs to its cow (or mother), ruled that every *son-book* (copy) belongs to its book (the original). Far from yielding to this decision, C. raised a number of his clansmen, attacked and routed King Diarmat, slaying several of his followers. For this affray, which was called the battle of Culdrevny, C. is said to have been excommunicated and banished for ever from Ireland by a synod of Irish bishops. This is improbable, as it is certain that he afterwards revisited Ireland, and exerted great political and ecclesiastical influence there. The battle of Culdrevny, however, seems to have induced him to leave Ireland and to enter on his missionary labours. In 563, C., then in his forty-second year, accompanied by twelve attendants or friends, some of them relatives, set sail for the W. of Scotland. Tradition states that he first landed at Salen, in the island of Mull, but finding the water unhealthy, he crossed to the other side of the island, and fixed his abode on Iona (q. v.). This small island has, from his day, been called *I Challum Cille* ('the isle of Colum of the Church'). The name Iona is shown by Dr Reeves to have arisen from the mere carelessness of a transcriber, and has nothing to do either with Hebrew or with the Latin C. Scotland was at this period mainly peopled by the Southern Picts occupying Wigtonshire, &c., the Strathclyde Britons or Cymri, whose capital was Dumbarton, the Northern Picts, who occupied the country N. of Athole along with the Hebrides, and the Scots, who ruled in Argyleshire. Connal, C.'s near relative, reigned in Argyle, and gave him whatever right he himself had over Iona. His people had embraced Christianity in Ireland. St Ninian had ministered among the Southern Picts; St Mungo was at that time labouring in the kingdom of Strathclyde, but the most numerous people of the whole, the Northern Picts, were still heathen. Unfortunately we have scarcely any account of the manner in which C. and his fellow-missionaries laboured among them, but St Adamnan tells of his reaching the dwelling of the Pictish king Brude, near Inverness, and after being for some time refused an interview, at length converting that monarch. He also relates that Brochan, King Brude's chief Druid, had a slave whom C. ordered him to release. He refused, but falling dangerously ill, he besought C.'s intercession for his recovery, which was promised, but on the condition of the slave's release. This was granted, and, along with similar incidents, must have greatly advanced C.'s moral influence. In the *Book of Deer*, written in the 11th or 12th century, we read that he and his pupil Drostan came to *Aberdoboir* (Aberdour) in the district of Buchan, where the Mormaor (high steward) Bede, a Pict, gave him in perpetuity that town, and that the town of Deer (*Deur*, tear) was conferred on him owing to the recovery of the Mormaor's son through the prayers of the Christians. We hear of C. also in Skye, and it is probable that he visited the Orkneys, while some of his successors took up their abode in Iceland. His biographer gives neither a minute nor a consecutive account of his travels, but merely fragmentary details.

We learn that in the year 573 his friend Connal, King of Dalriada, died, and the selection of his successor seems to have been mainly left to the decision of C. He chose Aidan, who proved himself the most talented of all his race. Next year we find him and King Aidan at the celebrated convention of Drumceat in Ireland, where, through his influence, various disputes between Argyle and Ulster were settled, and Argyle was made a free and independent kingdom. At this convention a sentence of death was passed on the bards for their rapacity and scurrility; but C. generously pleaded their cause, and procured a reversal of the decree, consenting, however, to a great reduction in their number. He visited his churches and monasteries in Ireland, and speedily returned to his beloved Iona. Here, at length, in the year 597, he entered into rest, and the closing scenes of his life show that, with all his natural violence of temper, he had learned much of the gentleness and benevolence of his Divine Master. On Saturday the 8th June, with his favourite attendant Diormit, he visited the granary, and blessed the food of his family, as his monks were called. Returning towards his own house, he rested for a time on a stone, when an old white horse, employed in carrying the milk from the byre to the monastery, rested its head on the saint's breast. Diormit was driving it away when C. forbade him, caressed and blessed the animal. On entering his house, he set himself to his favour-

ite work of transcribing the Scriptures, and on completing the 10th verse of Psalm xxxiv., laid down his pen, saying 'Baithen (one of his monks) must do the rest.' He attended vespers in the church, and was the first to return to it at the midnight vigil. He knelt before the altar, and passed peacefully away very early in the morning of the 9th June 597, at the age of seventy-six.

Many interesting questions must be briefly passed over. We read of his conversing with his Pictish cousins, yet needing an interpreter in preaching. This seems to prove that the old Pictish language was a middle dialect between the Gaelic and the Cymric, possessing words common to both, but in several respects differing from either.

His establishment in Iona was simple and primitive, but not so rude as is often supposed. There was a most methodical arrangement of outhouses—or farm-offices, in modern language—among others, a byre, showing the error of the common notion that C. permitted no cows on the island. We also have mention alike of a kitchen and a cook, a baker and a butler; *vide* Dr Reeve's *Adamnan*, pp. 334-368.

As to the Church constitution established at Iona, while it is clear that C. himself was a mere presbyter, yet since Bede affirms that the province, and even the bishops, were subject to the Abbot of Iona, we must conclude that something like apostolic authority was exercised by the great missionary, and descended to his successors, though there is no evidence that any definite 'system' of ecclesiastical government was ever adopted by them. The tradition that C. founded 100 monasteries and 300 churches is an evident exaggeration, but it is certain that he was the means of diffusing Christianity through the N. and W. of Scotland and the Hebrides. He greatly advanced religion in Ireland, and his successors carried the gospel to the N. of England. C. was a man of great energy and determination, but liable to outbursts of violence. He seems to have possessed an athletic frame, and Adamnan describes him as being of 'angelic beauty.' There are few men in Scottish history more deserving of national gratitude. His biography, written by St Adamnan (q. v.), has been issued, with notes and illustrations of the highest value, by Dr Reeves. See also *Historians of Scotland* (Edmonston & Douglas, Edinb. 1875).

Col'umban or **Columba'nus, St**, a native of Ireland, was born in Leinster about the middle of the 6th c. The Christian religion at this period flourished in Ireland as it did in no other country, and Irish missionaries went out far and wide to propagate it. C. was among the most famous of these. After a training at the monastery of Bangor—whose abbot was then Congall, the friend of Columba—C. departed for France in 589 along with twelve companions, the customary number in such cases. Here he established religious houses at Fontaine, Annegray, and Luxeuil in Burgundy. His reproofs, however, offended King Theodoric, and this, together with a dispute as to the celebration of Easter, compelled the Irish monks to leave the country in 610. After travelling through Switzerland, C. founded in 612 the celebrated monastery of Bobbio among the Apennines, on the river Trebbia, where he died three years later, having by his work aided much in advancing Western Christianity. His writings, which are in Latin, comprise twelve sermons, a monastic rule famed for its brevity and simplicity, some poems, and ecclesiastical treatises. M. Guizot has praised his sermons for their eloquence and power. C.'s works are contained in the *Collectanea Sacra* of Flemming (Louv. 1667), and his Life was written by Abbot Jónas, a successor in the abbacy of Bobbio. See also Lanigan's *Ecclesiastical History of Ireland*, vol. ii., Bähr's *Geschichte der Römis. Liter.*, and the Benedictine *Histoire Littéraire de la France*. C.'s name is preserved in the Lombard town of San Colombano.

Columbar'ium (Lat.), a dove-cot. The term was also applied to a sepulchral chamber, fitted up with niches resembling the holes of a pigeon-house, for the reception of funeral urns, called *ollæ*, and formed of baked clay. In these the ashes of the freedmen and slaves of great families were frequently deposited. A very perfect C. was discovered at the Villa Rufini near Rome in 1822.

Colum'bia, or **Or'egon**, originally a vast region of N. America, on the Pacific slope, extending from California to Alaska, It was claimed both by Spain and England, and was for some time a cause of dispute between the U.S. and England. By the treaty of June 12, 1846, the present boundary—49° and the Strait of Fuca—was agreed upon, and the original region is now divided into British C. (a province of Canada), the state of Oregon, and the territory of Washington.

Columbia, British, a province of the Dominion of Canada, is bounded E. by the Rocky Mountains, W. by the Pacific Ocean, S. by Washington Territory, and N. by the rivers Simpson and Peace. It includes Vancouver's Island (q. v.), and has an area of 213,000 sq. miles, and a pop. (1871) of 10,586, exclusive of some 40,000 Indians. The province has a rugged coast-line of some 700 miles, along which are scattered numerous islands, the largest after Vancouver being Queen Charlotte Island, Pitt Island, and Prince Royal Island. The mainland is traversed from N. to S. by two westerly ranges of the Rocky Mountains, and is watered by the Fraser, with its tributary the Thomson, and by the Simpson, the Columbia, and the Skeena. The climate varies greatly, according to the altitude and distance from the sea, but in the most populous parts it is temperate and equable, the temperature ranging from 75° F. in summer to 22° in winter. There are occasional tracts of rich arable land, and the hills and plains everywhere afford excellent bunch-grass pasture. Immense forests of cedar, pine, oak, maple, &c., offer inexhaustible supplies to a rapidly growing timber trade. Sea-otters, black, red, and silver foxes, fur seals, martens, beavers, &c., yield costly furs, while there are also buffaloes, bears, deer, goats, and grouse and other game in abundance. The fish found on the coasts and in the rivers include whales, seals, sturgeon, salmon, cod, halibut, anchovies, &c. The Fraser is specially famed for its salmon and its small oily 'oulachans.' But the importance of the province is mainly owing to its vast mineral resources. The mountains are composed chiefly of granite or mica-schist, with here and there masses of sandstone, limestone, and intruded trap, interbedded with clay-slate containing auriferous quartz. To the N. coal-beds and iron pyrites occur, the latter in great quantities. Gold is found everywhere, and among the other minerals are silver, iron, and copper. In 1871 new gold mines were opened in the district of Ominica and Peace, and in that year the total yield amounted to £300,000. Steam-vessels are now plying on the rivers, and the projected Interoceanic Canadian railway is to have its terminus in Vancouver's Island, after passing through the province. The capital is Victoria, and the other important places are New Westminster, Fort Alexander, and Fort George. B. C. became a member of the Dominion of Canada in 1871. It sends five representatives to the Parliament at Ottawa, and has a local Legislature and Executive Council, and is presided over by a Lieutenant-Governor. In 1870 the revenue of the province amounted to £102,290, the expenditure to £100,523, and the public debt to £322,328.

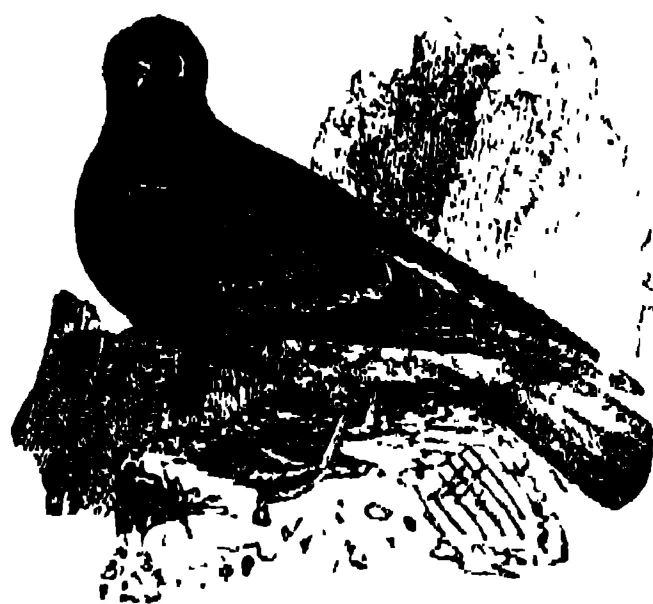
Columbia College, New York city, was founded in 1754, and is the fifth in regard to age in the U.S. It is controlled by the Episcopalians. C. C. has a law school, and a flourishing 'School of Mines.' President (1875), F. A. P. Barnard, LL.D.

Columbia, District of, is the seat of the Federal Government of the United States. It lies on the left bank of the Potomac, at the head of sloop-navigation, and originally belonged to the state of Maryland. When it was found necessary to establish the general Government in a district free from any local state jurisdiction, Maryland and Virginia gave up for this purpose a piece of land 100 sq. miles The part on the right bank of the Potomac was afterwards given back to Virginia, and the D. of C. is now 60 sq. miles. It is governed directly by the general Government, and is not represented in Congress. The chief cities are Washington and Georgetown. Pop. of district in 1870, 131,700, of whom about one-third were coloured.

Columbia River, or **Oregon** (the latter is the Indian name), the largest river on the W. side of N. America, rises in the Rocky Mountains. It pursues a winding course, and with its large and numerous tributaries drains an extensive region. Latterly it flows almost due W., near the N. boundary of the state of Oregon, and, after a course of 1000 miles, enters the Pacific between Cape Disappointment and Point Adams. It furnishes the only harbour on the Pacific slope between San Francisco and Fort Discovery, but although the mouth is 5 miles wide, there is only 4 or 5 fathoms of water at the bar. Navigation is open both to English and Americans, but vessels can only ascend about 100 miles.

The river was discovered by Captain Gray of Boston in 1792, who gave the name of his vessel, C., to it.

Colum'bidæ, a group of birds usually included among the sub-orders of the Insessores or Perchers, but occasionally considered a separate order of the class *Aves*. The C. are represented by the various groups of doves and pigeons. They perch on trees, a habit which ordinary Rasores do not exhibit. The upper mandible is horny, and arched at its apex, whilst it is also arched at its base, where the nostrils, covered by a cartilaginous plate, are situated. This plate is usually covered by a soft vascular membrane, which may appear in the form of a wart-like process. The wings of the C. are more powerful than those of ordinary Rasores. The hinder toe is as well developed as the three front toes, and is placed on the same level as the latter digits. These birds are all monogamous, and generally pair for life. Their young are born in a naked, helpless state, and thus differ from the young of Rasores. The crop is double, and of large size. The C. inhabit both warm and temperate climates, and from their susceptibility of domestication present innumerable varieties. The rock-dove (*Columbia Livia*) is the progenitor of our domestic breeds. See also CARRIER PIGEON, DOVE, FRUIT PIGEON, GOURA, GROUND PIGEON OR DOVE, PASSENGER PIGEON, &c.



Rock-Dove.

Col'umbine (*Aquilegia*), a genus of plants of the natural order *Ranunculaceæ*. There are many so-called species—many no doubt only varieties of each other—of which the best known is the common C. (*A. vulgaris*), long a favourite garden flower, and at one time esteemed in medicine as a diuretic and aperient. Most of the species of it are natives of the temperate and colder regions of the northern hemisphere.

Colum'bium, or **Nio'bium**, a rare metal, discovered in 1801 in *Columbite* from Massachusetts, and since then in a few other minerals. C. is identical with Rose's niobium, and not with tantalum, as supposed by Wollaston.

Colum'bus (the Latinised form of the Ital. *Colombo*, Span. *Colon*), **Christopher**, born at Genoa in 1436, was the son of a woolcomber, and was sent at an early age to school at Pavia, where he showed a taste for geography, geometry, and astronomy. At the age of fourteen he went to sea, and after having made a number of voyages in the Mediterranean, he made the bolder venture of a voyage to Iceland in 1467. About 1470 he settled in Lisbon, and married Phillipa Palestrello, the daughter of an Italian navigator, who, dying soon afterwards, left to his son-in-law all his charts, maps, journals, instruments, &c. These C. turned to account by constructing globes and maps for sale to support his family. About this time also he joined several successive expeditions to Guinea. At what period he at first conceived the idea of a passage westward to the shores of India it would be difficult to determine. His expeditions, however, to Iceland (where he *may* have read the record or heard the story of the earlier Norse discovery), to Madeira, the Canaries, the Azores, and the Portuguese settlements of Africa, suggested to him the possibility of crossing the Atlantic. His magnanimous spirit rose to the conception of the sea-passage to India, and he proposed his plans for the discovery of this W. passage successively to the states of Genoa, Portugal, Venice, France, England, and Spain. His project was regarded for many years as the hallucination of a visionary; but amid all his disappointments the magnificence of his scheme, and his firm conviction that he was the destined instrument of Heaven to carry the banner of the cross to all the ends of the earth, comforted and fortified his spirit. Years spent in pressing a disregarded suit, however, exhausted his means; and when, in 1480, he was travelling with his little son, Diego, in Andalusia, resolved to turn his back on Spain and appeal to France, he found himself destitute of the bare means of subsistence. Stopping before the convent of La Rabida, he begged for bread and water for his child. This act of paternal solicitude directly opened up the hitherto closed path to success, to the most splendid discovery in the annals of the race, to never-dying fame. Attracted by C.'s distinguished appearance, the superior of the convent entered into conversation with him, discussed his scheme for crossing the Atlantic, and furnished him with means and credentials to the court of Spain. Queen Isabella, after some time spent in hesitation and reflection, declared herself 'ready to assume the undertaking.' The arrangements between C. and the Spanish sovereigns were concluded April 17, 1492. Appointed admiral, viceroy, and governor-general of all such lands as he should discover, C. set sail with three vessels—two of them barques—and 120 men from Saltes, near Palos, on the 3d August 1492, and after a voyage of seventy days (during one-third of which he was detained refitting at the Canaries) he discovered the New World on the 12th October. The land first seen was one of the Bahama Islands, upon which C. landed, and with tears of joy and devout thanksgiving he solemnly planted the cross upon it, and named it San Salvador. He also discovered the islands of Cuba, San Domingo, &c., after which he set sail for Spain, and arrived there 15th March 1493. After this time C. made three successive voyages, discovering the Caribee Islands, Puerto Rico, Jamaica, Trinidad, and the N.E. coasts of S. America. The victim of misrepresentations, and driven by his officers and crews to abandon his legitimate object of discovery for the search for gold, and for the illusory El Dorado, the latter years of C.'s life were wasted, he lost the favour of King Ferdinand, and on 20th May 1506 he died at Valladolid in poverty and neglect. His remains were buried with great pomp at the King's expense, and over his grave a superb monument was raised. He had put his trust in princes, and he had his reward.

A short but interesting biography of C. by his son, Don Fernando Colon, is printed in Barcia's *Historiadores primitivos* (5 vols. Madr. 1749). The diary of C. on his voyage of discovery is to be found in Navarrete's *Viages de los Españoles* (5 vols. Madr. 1825–37), and has been translated into French, with annotations and additions, by Remusat, Balbi, Cuvier, &c., under the title *Relations des quatre Voyages entrepris par C., suivies de divers Lettres et Pièces inédites, &c.* (3 vols. Par. 1828). Recently (Lyon. 1864) Torre has prepared a *Raccolta completa* of C.'s writings. We may also note the biographies of C. by Bossi (Mil. 1818), Irving (4 vols. Lond. 1828), Sanguinetti (Gen. 1846), Reta (Tur. 1846); and the discussion of disputed points in Humboldt's *Cosmos*, and *Examen Critique de l'Histoire de la Géographie, &c.*; and also in Spotorno's *Codice Diplomatico Colombo-Americano* (Gen. 1823).

Columell'a, L., Ju'nius Modera'tus, the most copious and best-informed writer among the Romans on rural affairs, was born at Cadiz, and flourished in the early part of the 1st c. Any knowledge that we possess respecting him is derived from casual notices scattered through his writings. He died, probably at Tarentum, about 42 A.D. C.'s great work, *De Re Rustica*, in twelve books, is a systematic treatise on agriculture. He also wrote *De Arboribus*, in one book. The most complete edition of C. is that of J. G. Schneider (Leips. 1794–97), in the *Scriptores Rei Rusticæ*, containing an account of the various MSS. and of the gradual emendation of the text. Translations of C. exist in English, French, German, and other tongues.

Columellia'ceæ, a small order of Dicotyledonous plants, consisting of *Columella*, a genus of plants from the Andes, comprising two or three species. It is most nearly allied to the *Saxifragaceæ*, among which it may probably in time be allowed to take its place.

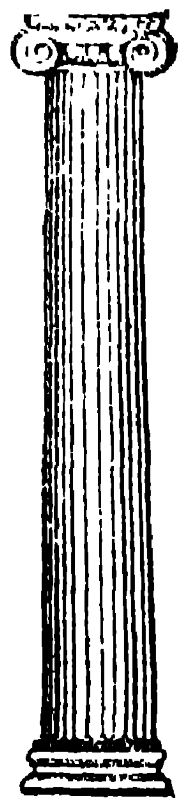
Col'umn (Lat. *columna*), a pillar of various materials, either standing alone, or supporting a superincumbent mass of building, or itself merely an architectural decoration. The solitary C., set up in memory of some person or event, is a structure of great antiquity. Jacob set up a pillar on Rachel's grave, and Absalom in his lifetime reared one for himself, because he had no son to keep his name in remembrance. It was not uncommon for the kings of the ancient East to inscribe their deeds on a pillar of stone, the latest discovered and most important of these being the Moabite Stone (q. v.), above 3 feet high, and about 2 feet in breadth as well as in thickness. As famous specimens of the solitary C., Pompey's Pillar, near Alexandria in Egypt, the columns of Trajan and Antonine in Rome, the

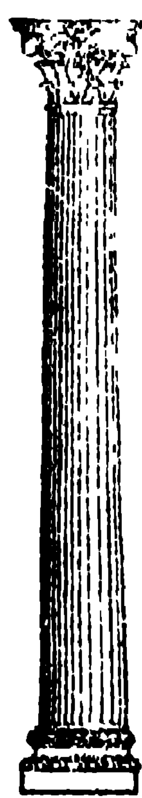
London Monument, the Vendôme C., and that of July in Paris, the Alexander monument in St Petersburg, and, latest and grandest, the C. of Victory erected at Berlin in 1873, may be mentioned.

The C. in architecture which supports a roof or entablature presents a special aspect of the civilisation of every country which has ever found time to enjoy and cultivate the arts of peace. In the architectural monuments of ancient *Egypt*, the C. is always found forming a portico inside the building, has no fixed proportion between the diameter of the shaft and its height, and frequently resembles the trunk of a palm-tree. The shaft of the *Assyrian* C. was tall and slender, and the capital sometimes terminated in two half bulls placed back to back. Rawlinson, in his *Five Great Monarchies*, gives an engraving of two capitals, one of which is very like the Ionic, and the other rather resembles the Corinthian style. The C. of the historical remains of India has a massive shaft surcharged with ornamentation; the capital is sometimes spheroidal, at other times it exhibits a sculpture of the lion, the bull, the elephant, or some fantastic animal. The kind of C., however, to which our attention must mainly be directed, is that which originated in Greece, and which with modifications has been reproduced in all countries to which Greece transmitted its civilisation and its arts. The Greek C. may be described as a pillar of wood, stone, or iron, circular on the plan, and rarely polygonal; either a truncated cone—that is, with the diameter of the shaft diminishing upwards, but having a slight swelling, called the *entasis*, about a third of its height from the base; or cylindrical—that is, with the diameter of the shaft the same from base to capital. It is divided into three principal points, the *base*, *shaft*, and *capital*—respectively its foot, body, and head.

There are three styles or orders of the Greek C.—the *Doric*, the *Ionic*, and the *Corinthian*; and to these the Romans added two other orders—the *Tuscan*, which is only a modification of the Doric, and the *Composite*, which is a combination of the Ionic and the Corinthian. The Doric and the Ionic columns were in use as early as the 30th Olympiad, B.C. 656, while the Corinthian is not known to have existed earlier than the 4th c. B.C.


Doric Column.


Ionic Column.


Corinthian Column.

The *Doric* is said to have been invented by the Dorians; it was frequently employed by them in their temples, and corresponds with the dignified and serious character traditionally assigned to them. It has no base, the foot of the C. resting immediately on the base of the rest of the temple. The shaft is a circular stem on which the entasis is very observable. Only on rare occasions was it monolithic; it was usually composed of drums laid on each other without mortar, but fastened to one another with dowels of cedarwood. Lengthwise this C. was striped with circular indentures, called *whippings* by the Greeks, *flutings* by us, the edges of which form sharp angles. On the shaft rests the chief characteristic of every style—the capital. It consists of three parts—the *neck*, a continuation of the shaft, from which it is separated by one or more indentures, called *amulets*; the neck widens in its upper part, and is generally ornamented with several amulets. Above this is the principal feature of the capital, the *echinus*, a circular ledge projecting forcibly all round. It is the supporting power of the C. under the weight of the beams and roof resting upon it. Above it there is the third part of the capital, the formal-looking beaver, or *abacus*, a square slab with square edges, which receives the chief beam or architrave. The height of the Doric C. is usually only four or five lengths of the diameter at its base.

The *Ionic* C. is more slender than the Doric; this and its more ornamental appearance being supposed to give expression to the lighter and more versatile character of the Ionic people. Its height on the average is equal to eight diameters. The base has the *plinth* as its lowest part, and above it there are two or more bolster-like prominences, each called a *torus*, which are separated from each other by a round groove called the *scotia*. The length of the diameter diminishes less upwards than that of the Doric and between the flutings there are small flat bands called *fillets*, in place of the sharp angles of the massive Doric C. The neck is embellished with ornaments; the echinus or *ovole* is less prominent, and shows the 'egg-and-arrow' carving which gives it the latter name. But the capital is rendered most striking by its *volutes*, which look like the abacus drooping under the weight of the architrave. There are two volutes to the face of the Ionic C., and two to the back. Sometimes, however, the volutes are placed diagonally, especially on the C. at the end of a row. Above them is a small slab, also ornamented, which receives the architrave.

The *Corinthian* C. resembles the Ionic in the proportions and mouldings of the base and shaft, but its capital is very strikingly peculiar to itself. It takes the shape of an open chalice formed by acanthus leaves. There are two rows of leaves, one above the other, eight in each row, the stems of the upper leaves rising from the same level as those of the lower. In the interstices between these masses of leaves are seen stems with smaller chalices at their tops, from which are developed two stalks, each of which droops like a volute under the weight of the abacus. The sides of the Corinthian abacus are concave in plan, being curved out so as to form a sharp point at each corner, which is cut off.

No authentic examples of the *Tuscan* C. have been left for observation; but it has been constructed according to a description given by Vitruvius in his work *De Architectura*. It differs from the Doric in having a base which consists of a plinth and tones; the shaft is not fluted, and the neck or collaring of the capital is separated from the shaft by a small convex moulding, called an *astragal*. Like the Doric, it has, as its chief feature, the echino-abacus capital.

The C. of the *Composite* order differs from that of the Corinthian mainly in the details of its capital, which is of a mixed character, blending the Ionic volutes with the Corinthian foliage. The outline of the leaves of the acanthus is, however, bolder than that of the Corinthian, and instead of two rows of leaves, there are sometimes three, between which volutes appear other flowers also, and the forms of men and animals. The order to which this C. belongs was specially affected by the Romans, the greater number of their large edifices being built in the Composite style. See ORDER, ENTABLATURE.

Column, Military, is a mass of soldiers several ranks in depth. A C. is said to be *open* when the spaces between the ranks composing it permit of their wheeling into line; otherwise it is a *close* or *half-distance* C. In action, authorities are not agreed as to the relative advantages of *line* and C.; English commanders have generally been in favour of the former, the French of the latter.

Col'ure, a semi-obsolete term in astronomy, applied to any great circle of this sphere passing through the equinoxes and solstices.

Colym'bidæ, a family of (*Brevipennatæ*) *Natatores* or Swimming birds, represented by the Grebes (*Podiceps*) and Loons or Divers (*Colymbus*), the latter being the typical forms. They have the three front-toes united by a web, and inhabit the coasts, seeking their food in the sea. In the grebes, the toes are united only at their bases by a membrane, and present broad lobes. The beak in all C. is conical and pointed, and the legs are placed far back on the body.

Col'za Oil is obtained by means of crushing-mills from the seeds of the Colza or summer rape (*Brassica campestris*, var

oleifera). Other species of *Brassica* yield a similar oil. The plant is largely cultivated in France, and the N. of Europe generally. C. O. is yellow, and the quantity procured averages about one-third the weight of the seed. It is used chiefly for purposes of illumination. *Rape-cake*, the residue after expression of the oil, is useful for manure.

Co'ma (Gr. *kōma*, 'a deep sleep') is a term used in medicine to describe a state of more or less insensibility, from which a patient can with difficulty, if at all, be roused. In severe cases of C. there is on the part of the patient not only obliviousness to all around him, but dilated pupils, strong stertorous breathing, and flaccid hands and legs. C. may be caused by Apoplexy (q. v.), in which case the person cannot be roused at all, and one or both pupils are dilated; by Concussion (q. v.), in which the breathing is easy and the pupils natural, while the patient in general soon awakes to partial consciousness; by opium poisoning, in which case the pupils are contracted, the breathing slow and stertorous, and the patient at first can be partially roused; or by intoxication, in which case there is generally an alcoholic smell in the breath. The treatment depends on the cause.

Coma Bereni'ces ('hair of Berenice'), a small and inconspicuous constellation of the northern hemisphere, situated between the tail of Ursa Major and the head of Virgo.

Comac'chio (the ancient *Comacula*), a fortified town and bishop's see, in the province of Ferrara, Central Italy, between 2 and 3 miles from the Adriatic, in the midst of an unhealthy lagoon, 140 miles in circumference, and famous for its eel culture. Across the narrow belt of mud which separates the lagoon from the Adriatic, canals have been constructed which admit the fry of the eel, mullet, &c., into the lagoon, where they fatten, and in due time are captured and sold. About a million pounds weight are caught annually. The eel-harvest is in autumn, and the men employed in it are lodged in barracks. There are rich saltworks in the neighbourhood. Pop. (of the commune) 8476.

Coman'ches. See INDIANS, AMERICAN.

Comat'ula. See CRINOID.

Comay'agua, the capital of Honduras, a state of Central America, on the river Ullua, near the S. edge of the plateau of C., noted for its beauty, fertility, and fine climate. The town was founded in 1540, became the seat of a bishop in 1561, but was almost destroyed in the civil broils that followed the 'emancipation' of the country from Spanish rule. It is now recovering, but its commerce is still unimportant, though a railway to Puerto Caballos, and to Fonseca Bay, on the Pacific, foreshadows a future prosperity. The only building of mark is the cathedral, and even of it nothing is fine but the outside. Pop. 18,000.

Comb (Old Eng. *camb*, Dutch *kam*, Fris. *kaem*, Low. Sc. *kaim*, Ger. *kamm*), an instrument with a series of teeth for arranging or fastening the hair, as well as for dressing and cleansing wool, flax, &c. Combs, as an article of the toilet, are of great antiquity: the Greeks and Romans used boxwood, ivory, and metal in their construction, but there is no evidence to show that women in early times employed combs to support the hair. Ancient burial-places in England have furnished examples of bone and ivory combs belonging to the Roman and Anglo-Saxon periods. In mediæval inventories of ecclesiastical treasures, combs are frequently mentioned, for it was customary for the priests before celebrating mass to wash their hands and arrange their hair. These ceremonial combs are usually carved or otherwise ornamented. An ivory C. which belonged to St Cuthbert is preserved at Durham, and that of St Loup, of ivory, jewelled, and carved with symbolical animals, is to be seen at Sens. The materials used in C.-making are horn, bone, wood, ivory, tortoise-shell, hardened india-rubber, and metal. Horns, having their tips cut off, are rendered pliant by heat, split up in the direction of the grain, and pressed flat. In the manufacture of side and ordinary dressing-combs, a piece of horn of the required size is stamped out, and from it two combs are made at once by means of the *parting-engine*. This ingenious machine is provided with a tooth-cutter, having a vertical movement, and by means of a cogged wheel, the plate of horn is shifted, as the cutter is rising, through a space equal to the interval between one tooth of the C. and the next. When all the teeth are cut, two complete combs, the teeth of the one fitting exactly into the spaces of the other, are *parted* by a dexterous pull. The teeth are then finished off with wedge-shaped files, called the *graille*, *carlet*, *topper*, &c., and the whole smoothed, buffed, and polished. Tortoise-shell is similarly operated on. Imitation tortoise-shell combs are made by treating the horn with nitric acid, and staining it with a composition of soda ley, quicklime, red-lead, and dragon's blood. Small-toothed combs are cut with a circular saw. Cheap and durable combs are now extensively made from vulcanite, in much the same manner as those from horn.

Combe, Andrew, M.D., an eminent physician, was born in Edinburgh, October 27, 1797. After studying medicine there and in Paris, he commenced to practise in Edinburgh in 1823, was appointed physician-in-ordinary to the King of Belgium (1836), which he was unable to retain on account of his health, and afterwards a physician-in-ordinary to the Queen in Scotland. He died at Edinburgh, 9th August 1847. Three years later his *Life and Correspondence* were published by his brother George. C., who was in every sense a most excellent, amiable, and benevolent man, has enriched medical literature with various valuable works, of which may be mentioned *Management of Infancy, Physiological and Moral* (1840, 9th ed. 1860, revised by his friend Sir James Clark), *Observations on Mental Derangement* (1831), and *The Principles of Physiology applied to the Preservation of Health* (1834, 15th ed. 1860), &c.—**George C.**, brother of the preceding, a phrenologist and philosopher, was born October 21, 1788, at Edinburgh, where he was educated, and became a writer to the signet in 1812. In 1816 he made the acquaintance of Dr Spurzheim, the well-known phrenologist, and ultimately adopted his principles. The fruit of this conversion was seen in his *Essays on Phrenology* (1819), and *Elements of Phrenology* (1824), which became very popular. In 1828 appeared his *Constitution of Man considered in Relation to External Objects*, which caused a considerable amount of hostile criticism, many maintaining that it was opposed to revealed religion, although its leading principle, the harmony of the constitution of man with the surrounding world making it incumbent on him to study the laws of nature, is now a commonplace. The real objection to C.'s philosophy is not what he says, but what he leaves unsaid. In 1833 C. married Cecilia, daughter of the famous Mrs Siddons. In 1837 he retired from the practice of his profession in order to give himself up to scientific and philosophical study, and from his active pen proceeded numerous books, not only on Phrenology, but on Popular Education (1833, 3d ed. 1848), Moral Philosophy (1840, 3d ed. 1846), Criminal Legislation, and Prison Discipline (1854), while he delivered courses of lectures on subjects with which he was familiar, in Great Britain and the United States, and on the Continent. His last work was published in 1857, entitled *The Relations between Science and Religion*. C. died 14th August 1858. His collection of books on phrenology is in the Advocates' Library, Edinburgh. See Gibbon's *Life of G. C.* (2 vols. Lond. 1878).

Com'bermere, Stapleton Stapleton-Cotton, Viscount, an English general, son of Sir Robert Salisbury Cotton, was born 14th November 1773 at Llewenny, in Denbighshire. He entered the army in 1790, distinguished himself in India, especially at the siege of Seringapatam, and in the Peninsular War. In 1810 he received the command of the whole allied cavalry under the Duke of Wellington, and fought in most of the Peninsular battles, being wounded at Salamanca. He was raised to the peerage as Baron C. in 1814. Among the numerous offices he filled subsequently to Waterloo were those of Governor of Barbadoes, Commander of the Forces in the West Indies, Commander-in-Chief in Ireland, and Commander-in-Chief in India, in which last position he captured the famous fortress of Bhurtpore in 1826. In the same year he was made Viscount; in 1852 he succeeded the Duke of Wellington as Constable of the Tower, and in 1855 was made Field-Marshal. C. died February 21, 1865.

Combina'tion (in sociology). This word has lately come into use, legally and politically, and denotes the union of persons having a common commercial interest, with the view of promoting that interest. It is chiefly employed in relation to the proceedings of the working classes for retaining, monopolies and advancing the rate of wages. The promotion of these ends is chiefly sought after by means of what are called *trades unions*.

In former times combinations, whether of workmen against their masters or of masters against their workmen, were illegal, and punishable summarily by justices of the peace. This state of law was altered by the statute of 6th Geo. IV. c. 129, by which C. was declared legal so long as unaccompanied by violence and intimidation. Trades unions and combinations, with the laws relating to them, were the subjects of a Royal Commission, which issued its report in 1869. The report gives a complete view of the recent alterations and working of the law regarding the subjects of inquiry. This led to the passing of two other Acts of Parliament in 1871. By these it is provided that the purposes of trades unions shall not be held illegal because they are in restraint of trade, so as to render void or voidable any agreement or trust executed under them. Trades unions may be registered under the first Act, which provides for the tenure and protection of their property. Under both Acts, the provisions of the law against violence and coercion on the part of unionists are repeated and re-enacted, and criminal unions and illegal contracts are defined.

To render C., when not accompanied by intimidation of others, illegal is plainly an infringement of personal liberty. If two or two hundred men—for the principle is the same in both cases—agree not to work for their masters under a certain rate of wages, they have just as much right to do so as their masters have to agree not to sell the produce of their workmen's labour under a certain price; the right in each case being unquestionable. It is equally plain that, when those who combine also try to force others to join them, *they* are infringing on personal liberty. But while the right of C. is thus properly conceded by the law to servants as well as to masters, it may be greatly doubted whether any permanent effect can be produced by it. If the workmen of England cannot or will not work at a rate of wages which will enable their masters to sell their produce abroad cheaper than those abroad can make it for themselves, it is plain that the trade of England must suffer, and thousands be thrown out of employment. These thousands must either return to work at a lower wage, or starve, or go elsewhere. See CONSPIRACY.

Combinations, Laws of (in chemistry). See ATOMIC THEORY.

Combinations (in mathematics). See PERMUTATIONS.

Combreta'ceæ, the Myrobalan order, a natural order of Dicotyledonous plants, natives of the tropics of America, Africa, and Asia, containing about 200 species, remarkable for their astringency. *Quisqualis Indica* of the Moluccas has anthelmintic seeds; *Combretum butyrosum* of S.E. Africa produces a vegetable butter. Myrobalans are produced by various species of *Terminalia*. See BEDDA NUTS.

Combus'tion may be popularly defined as the consumption of a substance with evolution of heat and light, when it is raised to a sufficiently high temperature in air or oxygen. The phenomenon of C. depends upon the union of the combustible body with oxygen, which, like other chemical actions, causes the disengagement of heat, and if sufficiently intense, of light also. Thus when charcoal is raised to a red heat, it continues to glow until it has burnt away, providing that sufficient air is present to support its C. On examining the substances which have been produced, it is found that they are wholly gaseous, and consist either of carbonic oxide (CO) or of carbonic acid (CO_2), according as the supply of air has been limited or excessive. Candles, coal, gas, &c., contain hydrogen in addition to carbon, and when burned produce water (H_2O) as well as the oxides of carbon. The process of respiration is another and very beautiful instance of C. Venous blood, highly charged with effete and useless matters rich in carbon, is pumped by the heart into the lungs, and is there exposed over a large surface to the action of the oxygen of the air. The useless materials of the blood become oxidised to carbonic acid and water, and escape from the body during the act of exhalation, while a new supply of oxygen is taken into the lungs again during inspiration: the heat produced by this oxidation or slow C. is carried off to all parts of the system by the purified (arterial) blood, and serves to maintain the temperature of the body.

The term C. is sometimes used in a more general sense by the chemists to denote other chemical actions than those of oxidation, attended with extrication of heat and light. Thus when copper or antimony in a state of fine division are thrown into chlorine gas, they become redhot and burn away, and in the same manner when a lighted candle is plunged into chlorine it continues to glow.

The theories regarding C. have varied from time to time, and have played an important part in the history of chemistry. Perhaps the most remarkable of these theories is that of *Phlogiston*, first brought forward by Stahl. Stahl believed that all combustible substances contained an inflammable material, which received the name of *Phlogiston, terra secunda*, or *terra inflammabilis*, and which was lost when they were consumed. Lead, for instance, when heated in air, smoulders away, and is eventually converted into a yellow powder (litharge). This yellow powder Stahl and his followers believed to be lead deprived of its phlogiston, or *dephlogisticated*. On heating litharge with charcoal, metallic lead is separated and the charcoal disappears. To account for this, it was assumed that the dephlogisticated lead took phlogiston from the charcoal and thus returned to its original state, whilst the charcoal lost its phlogiston and was converted into a gas. This theory was overturned by Lavoisier, who proved conclusively that a substance did not lose anything when burnt, but, on the contrary, gained in weight, and moreover gained in weight by an amount equal to that of the air consumed. The discovery of oxygen by Priestley paved the way for Lavoisier, and enabled him to explain the conversion of lead (Pb) into oxide of lead or litharge (PbO) when heated in air, and the subsequent *reduction* of the litharge by the charcoal, which removes the oxygen and forms with it the gaseous compound carbonic oxide.

Com'edy. See DRAMA.

Come'nius (*Komensky*), **Johann Amos**, an educational reformer, was born at Comna, near Brunn, 28th March 1592. After completing his university studies, he travelled in Holland and England, and thereafter resided at Lissa, in Poland. The most important of his ninety-two works are *Janua Linguarum Reserata* (1631) and *Orbis Sensualium Pictus* (1658). Their object was twofold—to facilitate the acquisition of the power of speaking and writing Latin by weaving numerous Latin words, not exclusively classical, into paragraphs, in which they might be easily learned; and to combine the knowledge of things with that of words, by treating in the lessons of subjects readily intelligible by the pupils, such as animals, trades, sports, and so on. These works were widely popular both in Germany and other countries, and have been frequently translated, imitated, and extended. From his high reputation C. was invited to England, to Sweden, and to Hungary, to aid in organising public instruction. Towards the close of his life he settled at Amsterdam. He died at Naarden, 15th November 1671. A Life of C., with his *Essay on the Education of Youth*, has been published by Mallalieu. See also Von Raumer's *Geschichte der Pädagogik* (4 vols. Stutt. 1846-55).

Com'es (Lat. 'companion') was the name given in the later times of the Roman Empire to a state official. Thus we find in the 4th c. an imperial officer in Britain called *Comes littoris Saxonici* ('warden of the Saxon coast'), *i.e.*, of the E. coast of Britain, already exposed to the ravages of Low German pirates. In the Teutonic system the C. was originally one of the *comitatus*, or personal following of a chief, the Old English name for whom was first *Eorl* or *Gesith*, the latter of which means exactly the same thing as C.; but as the power of the kings grew, *Gesith* was dropped for *Thegn* ('servant'), which gradually took the place of the older *Eorl*. The result was that *Eorl* then became distinctively a title of higher rank, and implied greater power and authority. Under the form of Earl (q. v.), it now denotes a particular grade in the peerage, and is held to be the equivalent of Count, for the wife of an Earl is a Countess. See Freeman's *Norman Conquest*, vol. i. c. 3.

Com'ets are celestial bodies, distinguishable from planets and stars by their rapid motions, their usually irregular forms, and the more or less hazy definition of their edges. Before astronomy was established as an exact science, these phenomena were regarded with superstitious dread, and each received the credit of having occasioned any dire calamity which occurred after its appearance, such as famine, pestilence, war, the death of some great person, &c. The only danger, however, which can possibly ensue from the presence of a comet is that arising from a collision with our earth; but as to the consequences of such a chance we cannot, in the present state of our knowledge, more than speculate. In the following sketch we shall first consider the peculiarities and characteristics presented by C. as regards their

form and appearance, their orbits and motions; then pass to the enumeration and description of some of the more celebrated historical appearances; and, in conclusion, discuss a few of the results already made out regarding their constitution, together with the various speculations and theories which have been thrown out of late years bearing upon the same question.

The striking feature of C. when seen with the naked eye, and a feature which at once distinguishes them from other celestial bodies, is their hairy-like appendage or *tail*—hence the name, from Lat. *coma*, 'hair.' The rest of the comet, or the *head*, is of a nebulous appearance, consisting of a hazy *envelope*, and a more or less bright *nucleus*. These characteristics are, however, not universal, some C. presenting merely a globular nucleated mass, without any tail, others not even a nucleus. In several instances, more tails than one have been observed, and it has been remarked that these appendages, when present, are generally turned away from the sun. The orbits in which C. move never approach the nearly circular form of those of the planets, but are distinctly elliptical—sometimes so eccentric as to be undistinguishable, for the comparatively brief time the comet is visible to us, from a parabola. There are also authenticated instances of hyperbolic orbits, the C. describing which of course cannot return to the solar system, unless perhaps the course be permanently altered through the perturbing influence of some of the larger planets. Again C. are found to move in planes inclined at all angles to the ecliptic, and to revolve round the sun with a motion as often *retrograde* as *direct*. As a comet approaches the sun, it diminishes in bulk, though to us, whom it also approaches, it may appear to increase. The tail is a later development, and is not present when the comet is first observed by the telescope. It is subject to constant changes and pulsations, sometimes seeming to sweep through space at a speed to which the planetary velocities are scarcely comparable. The head, when viewed through a telescope, not unfrequently presents the appearance of a series of concentric luminous rings, with a bright nucleus in the centre; while at other times the nucleus emits on the side next the sun jets as it were of flame, moving and vibrating as if in a region of conflicting currents.

One of the most interesting C. of modern times is Halley's—interesting especially as being the first whose periodic revolution was recognised, and whose return was boldly predicted by that celebrated astronomer. Noticing the great similarity between the elements of the C. of 1531, 1607, and 1682, Halley fixed the reappearance of the 1682 comet for the year 1759. As the time approached, Clairaut, calculating from the observations of 1682, and taking into account the possibly perturbing influence of Jupiter and Saturn, fixed its perihelion passage for April 13, 1759. The true date was March 12. Messrs Damoiseau and Pontecoulant calculated its next return for November 7, 1835, and the calculation differed from the observed time by less than a week. Its next appearance will be in 1910, and the same comet has been identified with those of 1456 and 1378, the latter of which was observed by the Chinese. It is noticeable that this comet has been diminishing in splendour at each reappearance, and probably after a few more returns it will become invisible to the naked eye. The comet of 1744 is remarkable as having had six tails. The present century has been uncommonly rich in brilliant C., of which we may mention the two great ones of 1811; those of 1819, 1825, and 1847; that of 1843, whose head was only 96,000 miles from the sun's surface at its perihelion passage, and whose tail, not less than a hundred million of miles long, seemed to sweep through two right angles in two hours; the brilliant appearances of 1858 (Donati's) and 1861, both remarkable for the rapid evolutions and dissipations of their envelopes, and the latter further interesting from the now almost settled fact that the earth passed through the extremity of its beautiful fan-shaped tail on the evening of June 30; and, lastly, Coggia's second comet of 1874. This list, however, gives little or no idea of the numerous C. visible by telescopic aid, and far less of the myriads which probably exist, but which have hitherto escaped detection. The most interesting of these telescopic C., possessing as they do short periods, and therefore belonging more to our system than their farther-reaching brethren, are Encke's (period 3·29 years), De Vico's (5·46), Winnecke's (5·51), Brorsen's (5·58), Biela's (6·61), D'Arrest's (6·64), Faye's (7·44). Biela's comet was discovered by that astronomer in 1826, and identified with the C. of 1772 and 1805, in which latter year it was seen by Olbers with the naked eye. In 1846 it was observed to split into two portions, which were still distinct on its next appearance in 1852. In 1859 and 1866, though eagerly looked for, no signs of its existence were detected, and it was regarded by many as a thing of the past. Mr Hind, however, calculated its perihelion passage for October 6, 1872, from Dr Michez's orbit of 1866, and prepared sweeping ephemerides for September and October, with variations of ± 8 days in perihelion passage. It escaped observation, however, till November 30, when Mr Pogson, Madras Observatory, received a startling telegram from Professor Klinkerfues, which ran thus: 'Biela touched earth on 27th; search near Theta Centauri.' After two mornings of vain search, a glimpse of it was obtained. Circumstances were more favourable on December 3, when the comet was seen with a bright nucleus and a faint but distinct tail. It has been doubted, however, whether this comet was really Biela's, and was not rather another and quite a distinct body. Coggia's small comet of 1873 has been identified by Professor Weiss of Vienna with the first of 1818, discovered by Pons at Marseilles, the plane of whose orbit was so nearly parallel to that of Biela's, that by some it was supposed to have been derived from the latter by a splitting analogous to what was observed in 1852. Every year several of these hazy telescopic bodies are discovered, but they possess little interest save to the astronomer.

The first step towards the true comprehension of what C. really are was made by Tycho Brahé, when he demonstrated in 1577 that they were extraneous to our atmosphere. Not much more than a century later, Newton showed them to be subject, like planets, to the law of gravitation; and sometime after the lapse of another century, Arago discovered that part, at least, of cometary light was *polarised by reflection*. This last discovery has been fully borne out by the recent spectrum investigations of Huggins, Donati, Secchi, Vogel, and others. Unfortunately, no comet of any size, with the exception of Coggia's, which was badly situated for observation, has appeared since the introduction of the spectroscope as a useful, and now indispensable, instrument in astronomical research; and, accordingly the spectroscopists have had to content themselves as yet with Brorsen's, Winnecke's, and other telescopic C. These all show one or more bright lines, accompanied by a more or less faint continuous spectrum. It is thus apparent that C. shine partly by reflection, partly by their own light. The characteristic bright lines in Winnecke's comet coincide very closely with the bright lines in the spectrum of carbon taken in olefiant gas; but, in the majority of cases hitherto observed, there is *no* similarity in constitution to any such hydrocarbon. At the present stage of our knowledge, we cannot reason further concerning the composition of the gaseous portion of C.; but this at least is made out, that probably a comet consists of a cloud of solid particles, held together more because their individual orbits are somewhat similar, than because of their own mutual gravitation, and that therefore as it approaches the sun it shrinks in bulk, the orbits of the component meteorites rapidly converging, and the particles themselves coming into frequent collisions, thus generating sufficient heat to volatilise a part of the matter, and giving rise to all the varied changes observable in a comet's head by telescopic aid. This theory is supported by the coincidence, first noticed by Ochiaparelli, which seems to exist between the orbit of the August meteors and that of the second comet of 1862, and the further seemingly similar connection between the November meteors and the comet discovered by Klinkerfues and Pogson, and believed by them to be Biela's. When the meteor-cloud is sufficiently dense, it is visible as a comet; and the extremely eccentric orbits which these bodies describe round the sun, the sometimes great inclinations to the ecliptic, and their frequently retrograde motions, show that, if the nebular hypothesis be granted, C. and meteors did not belong originally to the solar system, but are later importations caught up from surrounding space by the attraction of the sun and planets. All this is an evident inference; but when we come to the consideration of the tail, a new and greater difficulty meets us. It is scarcely possible that this tail can be one and the same material *appendage*, for that matter should be translated with a velocity of more than 30,000 miles per second—the velocity of the extremity of the tail of the comet of 1843 during its perihelion passage—is inconceivable. To meet this difficulty, Sir John Herschel has speculated on the possibility of a '*negative shadow*, a momentary impression made on the luminiferous æther behind the comet.' Pro-

fessor Tyndall has worked upon this idea, and has explained the momentary impression as due to the decomposition by the concentrated rays of the sun of some chemical compound surrounding the comet—the head acting in some mysterious way as a lens. But if it act as a lens to sunlight, why not to starlight also? Further, whence comes the necessary organic compound? By assumptions of such a nature, any curious phenomenon could be plausibly explained; but no simplicity or better comprehension of the facts is gained. Professor Tait, however, merely discarding the once prevalent idea that C. must have extremely small mass—an idea *taken for granted* upon the ground that *one* comet in 1779 became entangled among Jupiter's satellites, which were not perceptibly perturbed by the encounter—has explained the whole mystery as an optical condition. He likens a comet to a swarm of sea-larks, viewed at such a distance that the birds are not *individually* visible; and in the remarkable changes of form which such a swarm seems to undergo, a consequence of the relative changes of position of the line of sight and the surface in which the birds are situated, he discovers an explanation for all the varied transformations observable in a comet's tail. Thus (see *Cosmical Astronomy, Good Words*, December 1875) 'the gigantic motions of the tail in sweeping round the sun may be merely the running along of the optical condition of visibility among a swarm of separate objects, each of which is moving with a velocity neither extravagantly greater nor extravagantly less than would characterise a planet or other portion of matter at the same distance from the sun.' There is no limit to the size of the component meteorites, but the smaller we suppose the integral fragments to be, the greater must be the average distance between contiguous ones in order to secure transparency to starlight—the less therefore the mass. Upon this hypothesis, the passage of the earth through the *head* of a comet would be fraught with great danger; but the probability of such an occurrence is evidently extremely small, if we assume that C. may approach the sun from any direction. This assumption, however, may require modification, if future research bear out the discovery of M. Houzeau, that of 209 C. considered by him, the major axes show a tendency to arrange themselves parallel to the double heliocentric meridian 102° 20' and 282° 20', being only 28° long. from the point towards which the solar system is moving.

Com'frey (*Symphytum*), a genus of plants of the natural order *Boraginaceæ* (q. v.), natives of Europe and the N. of Asia. There are only a few species known. *C. officinale* and *C. tuberosum* are natives of Britain, not uncommon in moist shady places. The former was at one time greatly valued as an application to wounds, and the young blanched shoots are sometimes used as a potherb, or as a substitute for spinach. The root contains a good deal of starch and mucilage; accordingly, when finely scraped 'and laid on calico to the thickness of a crown-piece, it forms an excellent bandage for broken limbs,' &c. (Bentley). A large-sized species—*C. asperrimum* of the Caucasus—may yet become of some value as a fodder plant for pigs and cattle, analysis showing it to be rich in flesh-forming principles: it contains much gum and mucilage and but little sugar. It was introduced into this country in 1811, but is as yet only cultivated as a garden plant.

Comines' or Comynes, Philippe de, Sieur d'Argenton, a famous French chronicler, was born near Lille in 1445. In 1464 he entered the service of Charles, Comte de Charolais, afterwards Charles the Rash of Burgundy, but in 1472 he attached himself to Charles's rival, Louis XI., who, within five years, made him one of the richest nobles of France. Louis found in C. an astute and unscrupulous agent of his cruel and perfidious policy. After the death of Louis, Anne of Beaujeu banished C. from the court; but though a decree of Parliament of 24th March 1488 had condemned him to lose a fourth of his estates, and to ten years' banishment, we find him as early as 1493 again engaged in important missions. He was employed both by Charles VIII. and Louis XII., the latter of whom restored his pensions, but withheld his confidence from the minister of Louis XI. He died, 17th October 1509, at his castle of Argenton. C.'s *Mémoires* show him to have been a sagacious, clear-headed statesman; but, though admirably written, they offend modern feeling by the cold-bloodedness with which they detail the most iniquitous and revolting transactions, the sole merit of each of which seems to be its success. The first edition, which is imperfect, was published at Paris in 1523, in folio. The best is that of Mlle. Dupont (3 vols. Par. 1850). C. plays an important part in Scott's *Quentin Durward.*

Comi'so, a town of Sicily, province of Notto, 43 miles W.S.W. of Syracuse, with manufactures of paper. Pop. about 10,000.

Com'itas or **Com'ity of Nations**, a term of international law, signifying the effect given in one country to the laws and institutions of another in questions arising between the natives of both. See INTERNATIONAL LAW.

Comi'tia (Lat. *cum*, 'together;' *eo*, 'I go'), were the great constitutional assemblies of the Roman citizens, duly summoned by a magistrate for the election of magistrates, the enactment of law, the declaration of war, and the trial of citizens on criminal charges. The *Comitium* was the part of the Forum where the C. met in early times, though afterwards their meetings were usually held in the Campus Martius. The C. were of three kinds, *C. Curiata, C. Centuriata*, and *C. Tributa*, in which the people voted respectively in curiæ, centuries, and tribes, according to the three modes of their political organisation. Each citizen voted in his own curia, century, or tribe; but each curia, century, and tribe had only one vote on the question submitted, and its vote was determined by the majority of voters within it. Thus, as some centuries, for example, contained a much larger number of voters than others, the decision might not be the opinion of the gross majority of the assembly. The C. Curiata were the most ancient, and were composed entirely of patricians. The C. Centuriata, instituted by Servius Tullius, were truly national assemblies, comprehending all citizens, whether patricians or plebeians, who had property to a certain amount. The C. Tributa were originally confined to the plebeians, and were convened for the first time in the trial of Coriolanus, B.C. 491. The word *C.* often means *elections*, as the C. were yearly convened under the republic to elect magistrates. The C. Calata were assemblies convened by the college of pontiffs, at which the people, sometimes in curiæ, at others in centuries, did not vote, but listened to and witnessed the proceedings, which consisted chiefly of the proclamation of the nones, the consecration of priests and kings, and the making of wills.

Comm'a. See PUNCTUATION.

Comma, in music, a small interval (generally corresponding to a vibration-ratio of 81 : 80) occurring between the true pitches of two notes, which are represented by one only in the organ, pianoforte, and other tempered instruments. See TEMPERAMENT.

Commandant' is an officer of the army in merely temporary command. The designation is more frequently applied in foreign armies than in the British.

Command'er, in the British navy, is an officer next in rank above a lieutenant and under a post-captain. He ranks with a lieutenant-colonel in the army, and is unofficially addressed *Captain.* The full pay of a C. is £1 per day; when in command of a sea-going ship, 3s. 9d. additional. The half-pay of the first hundred commanders on the active list is 10s per day, of the remainder, 8s. 6d. A C. may either serve as second in command, or command independently, according to the rate of the ship.

Commander-in-Chief is the highest appointment in the British army. There is not, however, necessarily an officer of this rank in command of the home army, there having been no C.-in-C. since the death of the Duke of Wellington in 1852. At present the administration of the army is, by the War Office Act of 1870, vested, under the Secretary of State for War, in three officers, one of whom has the title of 'Commanding-in-Chief.' The office is presently held by Field-Marshal the Duke of Cambridge, his department being that of command and discipline. Though in theory all appointments and promotions are made by the crown, on the responsibility of the Secretary of State for War, the officer commanding-in-chief has practically the control of all these, except, perhaps, the very highest. He is responsible for recruiting operations, and for the allocation of the troops. The commander of the forces in India has the title of C.-in-C.

Comm'andite, Société en, is the French equivalent term for what we call a 'sleeping partner.' By the common law of

France, a partner of this kind may, by agreement with his associate, determine the extent of his liability to the public. The justice of the legal principle has to a great extent been recognised by ourselves in the passing of the Limited Liability Act (q. v.). The French term arises from the commercial meaning of the word *commander*, to command. It is applied to the authorising of one person by another to transact business on his account.

Commelyna'ceæ, the Spiderworts, a natural order of Monocotyledonous plants, natives of the E. and W. Indies, Australia, Africa, and N. America. The underground stems of many of these, on account of the starch which they contain, are used for food. In the jointed hairs of the Virginia spiderwort (*Tradescantia Virginica*), a common garden flower, and other species, the singular movement known as *Gyration* (q. v.) can be well examined. *Commelyna cœlestis* is also a well-known cultivated species. Altogether sixteen genera and more than 260 species are described. Some are accounted astringent, and therefore useful as applications to wounds; others are emmenagogue, &c.

Commen'dam. When a beneficed clergyman is promoted to a bishopric, he vacates his benefice by the promotion; but formerly the sovereign could give him the right to retain it. He was then said to hold it *in C.*, that was, ostensibly, until some one else should be provided for it. Future grants in C. were abolished by 6 and 7 Will. IV. c. 77.

Commendator.—In Scotland, in Roman Catholic times, the revenues of a benefice during a vacancy were collected by an officer called a C. He was properly a steward or trustee; but the Pope, who was entitled to grant the higher benefices in *Commendam* (q. v.), abused the power, and gave them to commendators for their lives. This abuse led to the prohibition of all commendams, excepting those granted by bishops for a term not exceeding six months.

Commen'surable, a name applied to two numbers or quantities of the same kind, which are both divisible without remainder by a third number.

Comm'entry, the chief town of a canton in the department Allier, France, in a hilly region on the Œil, 45 miles S.W. of Moulins by railway. It owes its great and sudden prosperity to large coal-mines in the vicinity, and to an extensive iron-work, employing 1200 men. Pop. (1872) 9058.

Comm'erce, Offen'ces against. The commercial code of the country has undergone material alterations in late sessions of Parliament, and many regulations founded on mistaken notions of the public interest, and which interfered with the general principle of commercial freedom, have been repealed. One of the most noteworthy of these reforms is the repeal throughout the United Kingdom of all the Acts against usury. By this repeal the capitalist is as unfettered in the employment of his money as the landlord is in the disposal of his land and the labourer in the disposal of his industry. See FALSE PRETENCES, FRAUDS, SMUGGLING, INTEREST, CHAMBER OF COMMERCE.

Commer'cial Law. See MERCANTILE LAW.

Commina'tion (Lat. *comminatio*, 'a threatening') is the name of a penitential service used in the early Christian Church. It is still read in the Church of England on Ash Wednesday. It purports 'to read the general sentences of God's cursing against impenitent sinners, gathered out of the seven-and-twentieth chapter of Deuteronomy and other places of Scripture.' See Bingham's *Eccles. Antiquities*.

Commissa'riat is the name given to the system by which armies are supplied with the necessaries of life. In the wars of Queen Anne's reign the troops were supplied by contract, a plan which is said to have led to considerable peculation on the part of the famous general who conducted them. In 1793 a commissary-general was appointed, his duty being to superintend the contracts for supplying the army with food. In 1858 and 1859 a new organisation was introduced, the C. being made a department of the War Office. In 1870 it was merged in the 'Control Department,' by which the civil affairs of the army are now administered. The ranks of the C. are commissary, deputy-commissary, assistant-commissary, and sub-assistant commissary.

Comm'issary, in ecclesiastical law, is an officer who acts for the bishop in a remote part of the diocese. In Scotland, following the abolition of papal authority in 1560, the supreme C. court was instituted by Queen Mary in 1563. It had jurisdiction in matrimonial cases, and had a double jurisdiction, one *diocesan* over the three Lothians, the other universal, by which it confirmed the testaments of all who died in foreign countries, or who died in Scotland without a fixed domicile. It also reviewed the judgments of inferior commissaries, of whom there was one in most of the principal towns of Scotland. The powers of the supreme court (abolished in 1836) were gradually transferred to the Court of Session; those of the inferior courts partly passed to the Court of Session and partly to the sheriff courts; but 'even yet,' says Sheriff Dove Wilson, 'the transference of jurisdiction is in form incomplete. In certain actions the sheriff assumes the style and title of C., and uses a seal decorated with the episcopal mitre.' See *The Introduction to Practice of the Sheriff Courts*, by J. Dove Wilson, advocate (Edinb. 1875).

Commis'sion is in law a writing or implied mandate authorising one, or more than one, person to exercise the duties and powers belonging to another or to others. (See AGENT.) There are various legal operations conducted by C., of which the following are the most important:—

Commission of Oyer and Terminer.—This, in English law, is a C. directed to the judges and other gentlemen of the county to which it is issued, directing them to hear and determine in cases of alleged treasons, felonies, and trespasses. It is in virtue of this C. that the judges on circuit dispose of criminal cases. In urgent cases, a special C. of O. and T. is granted. It may be extended to Scotland, provided three Lords of Justiciary be in the C.

Commission of the Peace. See JUSTICES OF THE PEACE.

Commission for taking Proof.—In the Court of Session in Scotland, as well as in the inferior courts, parole proof may be taken under a C. granted by the court. The commissioner is delegated to take the oaths and depositions of witnesses, and to report these to the court. The C. is invariably accompanied by a Diligence (q. v.), which is also a judicial warrant under which the witnesses are cited, and may be compelled to attend the commissioner for examination. The Act 6 and 7 Vict. c. 82, makes it compulsory on witnesses and Havers (q. v.) (*i.e.*, holders of writings) to attend before a commissioner appointed by the Scotch courts; and a C. issuing from an English or Irish court has the same power of execution in Scotland.

Commission, Army, is the crown's warrant constituting a commissioned officer in the army. Formerly, under what was called the *Purchase System* (q. v.), the various ranks were mostly obtainable at a fixed price. But this system was abolished by royal warrant in July 1871. Commissions in the probationary ranks are now given to the successful candidates in competitive examination. The limits of age for candidates for admission — competition to the cavalry and infantry are seventeen and twenty; for students of universities who have passed certain examinations, the limits are seventeen and twenty-one; for B.A. or M.A. graduates, seventeen to twenty-two. To qualify for lieutenant, a sub-lieutenant must serve satisfactorily in a regiment for twelve months, after which he must study at a military college and pass an examination. In the Artillery and Engineers, candidates, selected on examination, are trained at Woolwich Academy. Lieutenancies are given to cadets who have passed an examination on the subjects of instruction. Further examination must be passed before getting a captain's C. in any branch of the service. Promotion is now by 'selection, tempered by seniority,' up to the rank of lieutenant-colonel (see COLONEL, BREVET) in the cavalry and infantry. In the Artillery and Engineers it is by seniority alone. Non-commissioned officers are the sergeants-major, sergeants, trumpeters, drummers, buglers, and in the Life Guards and Horse Guards the corporals. They mess by themselves, and rank between a commissioned officer and a private soldier.

Commiss'ionaire is an attendant attached to Continental hotels, but not forming a part of the establishment. Thus his services are not charged in the bill, and must be arranged for with the C. himself. No one is, of course, obliged to employ him. In some hotels, though not in many, we have found the C. very troublesome and officious, offering to do all kinds of petty services, such as posting letters, &c., for which he expected wholly disproportionate payment. There are, however, many

occasions on which the C. is very useful, especially to those who do not speak the language of the country in which they are travelling. Commissionaires can nearly always speak English, and generally French also. For a day's attendance they usually expect about seven francs; for looking after the registering of luggage, taking tickets, &c., in starting on a railway journey, or for meeting one on arrival, and looking after the luggage, &c., five francs is the proper fee of a C.

Commission del Crederé is an Italian expression, used to denote the extra premium charged by an agent or factor for guaranteeing the solvency of a purchaser, and so making himself personally liable for the value of the goods which he has sold for his principal. See AGENT.

Commission Merchant is a merchant who sells goods on account of some one else. The C. M. is paid by a percentage, called *commission*, on the value sold.

Commission of Assembly. See GENERAL ASSEMBLY.

Commis'sioner in Scotch Bankruptcy. Under the Scotch Bankruptcy Act, three commissioners are chosen at the meeting for election of trustee. Their duty is to superintend, to advise, and assist the trustee, and to fix his remuneration. They are not themselves entitled to any remuneration. No one can be a C. who is disqualified to be a trustee. See BANKRUPTCY.

Commissioner of Police, for London and neighbourhood, is appointed under 19 and 20 Vict. c. 2. The C. of P. and the constables are empowered to enforce regulations of the Police Acts respecting houses of public resort, driving vehicles and cattle, nuisances in thoroughfares, &c. They have also power to act on the river Thames, and they may at any time go on board vessels, and take cognisance of the conduct of persons on board.

Commissioners of Justiciary. See JUSTICIARY, COURT OF.

Commissioners of Teinds. See TEIND COURT.

Commissioners of the Jury Court. See JURY TRIAL.

Commit'ment for Trial. When a supposed offender is arrested, the justice before whom he is brought is bound immediately to inquire into the circumstances of the alleged crime, and to take the examination of the prisoner, and the evidence of those who bring him, in writing. If the charge appear groundless, the prisoner must forthwith be discharged; otherwise he must be *committed*, or give Bail (q. v.) for his appearance to answer the accusation at next sessions or assize, and the prosecutor or person injured by the crime charged is bound over to prosecute. In Scotland the information is generally at the instance of the Procurator-Fiscal (q. v.), and C. for T. or discharge is given after the declaration of the accused and the Precognition (q. v.) have been taken before a magistrate. See IMPRISONMENT.

Commitment of a Bill. See PARLIAMENT.

Committ'ee. When an assembly or body of men appoints a few of its members to do special acts, or to make special inquiry, those so appointed form what is called a C. It may, however, consist of only one member; or it may be formed of the whole body making the appointment by its assuming the functions usually discharged by a C. Thus, in Parliament, when the various clauses of a measure which has been passed on second reading—and thus been virtually adopted in its leading principle—come to be considered, a 'C. of the whole House' is formed for doing so. The Speaker leaves the chair, which is taken by the Chairman of Committees. (See PARLIAMENT.) Select committees are also appointed in the House of Commons and in the House of Lords for the consideration of private bills.

Committee of Parliament. See PARLIAMENT.

Commix'tion, a term of Scotch law, indicating the mingling of two or more substances. C. may produce a new subject, as where wine is mixed; or it may not alter the nature of either substance, as where grain is mixed. This distinction is of some legal weight in questions which sometimes arise as to right of property.

Comm'odate, in Scotch law, is a gratuitous loan, the borrower being bound to restore the subject lent in the condition in which he received it. See BORROWING.

Comm'odore. A captain in the navy, when in command, has this title. He hoists a pennant indicative of his rank. Red indicates a C. of the first class, blue a C. of the second. He ranks with a brigadier-general in the army. The pay of a C. of the first class is £3 per day; of a C. of the second class, in addition to pay as a captain, if C.-in-chief, £1 per day; if not, 10s. per day.

Comm'odus, Lucius Aurelius, a Roman emperor, born 161 A.D., the son of M. Aurelius Antoninus, who educated him with unavailing care. On his father's death in March 180, C. concluded an inglorious peace with the Marcomanni, and repaired to the capital to share in its dissipations. His character immediately exhibited itself as one of boundless licentiousness, cruelty, cowardice, meanness, and perfidy; and distinguished virtue, or conspicuous excellence of any kind, soon proved fatal to its possessor. Resigning the government into the hands of a succession of worthless favourites, he rioted in debauchery, and gratified a childish vanity by exhibiting himself as a dancer, a charioteer, a buffoon, and especially as a gladiator. He even claimed divine honours as Hercules. Marcia, a favourite mistress, with Lætus and Eclectus, two officers of rank, learning that they were marked down on the tyrant's tablets for instant death, administered poison to him; but this operating slowly, they introduced Narcissus, a famous athlete, into his chamber, and he was strangled on the night of December 31, 192 A.D.

Comm'on. This is a term of English and Scotch law, but the meaning in the former differs from that in the latter. In England, C. is the privilege of use which one man, or the public, has of the property of another; such as the right to walk over or to fish from the land of another: hence lands over which such rights exist are called *commons*. The 8 and 9 Vict. is an Act whose objects are described to be to facilitate the enclosure and improvement of commons of certain descriptions, and held under certain rights, which obstruct cultivation and the productive employment of labour.

The expediency of this measure has been much questioned. 'We look with the utmost jealousy,' says Mr J. S. Mill, 'upon any further enclosure of commons. In the greater part of this island, exclusive of the mountain and moor district, there is certainly not more land remaining in a state of natural wildness than is desirable. . . . The C. is the peasant's park.'

Under the Act a Board of Commissioners, called the Enclosure Commissioners, is appointed to inquire into the expediency of any proposed enclosure, and to report to Parliament regarding it.

In Scotland, where the legal nomenclature is that of the Roman law, C. rights are called *Servitudes* (q. v.), while a C. or commontry is a piece of ground belonging to several persons, frequently to the inhabitants of a district or village, the right of each usually amounting to nothing more than a servitude. The C. is divisible by an action in the Court of Session, at the instance of any one having an interest. Nice questions, however, sometimes arise as to whether a right be of C. property or of servitude merely.

Common Agent is, in Scotch legal practice, an agent or solicitor before the Court of Session, employed to conduct a case in which several parties have a common interest. The two most important occasions for the appointment of a C. A. are in the process of Ranking and Sale (q. v.), and in the process of augmentation and locality. (See AUGMENTATION.) But a C. A. is also sometimes appointed in a process of Multiplepoinding (q. v.).

Common Debtor.—When the effects of a debtor have been arrested, and several creditors claim a share of them, the debtor is, in Scotch law, called the C. D.

Common Forms.—By this term is meant, in English law, the technical forms of expression used in legal writings. Statutes have been passed to substitute simpler and more generally intelligible expressions for many of these. But the fact that conveyancers were paid for the length of their work, not according to its value or difficulty, has rendered difficult the substitution of intelligible brevity for unintelligible prolixity.

Common Good.—In law this term is used to denote the property

of a corporation, over which the magistrates have a right of administration solely for behoof of the corporation.

Common Interest.—This term is used in Scotch law to denote the interest which one person sometimes has in the preservation of that which is otherwise absolutely the property of another. Thus, the proprietor of a house may have a C. I. with the proprietor of a contiguous house in a chimney-can which is the property of the latter, if the falling of the can would injure the property of the former.

Common Property, in Scotch law, is property, whether heritable or movable, belonging to two or more proprietors *pro indiviso.* (See INDIVISIBLE.) The proprietors share the profit or loss according to their respective interests, and the consent of all is required in the management and disposal of the subject. Each joint-owner may sell his right, the purchaser taking his place; and the right may be adjudged (see ADJUDICATION) by the creditors of the C. proprietors, or of any of them.

Common, Tenancy in, or Joint-Tenancy.—This term of English law corresponds to that of C. Property (q. v) in Scotch law. It denotes the rights of property vested in two or more persons, no division having been made of the property. The owners may agree to a division, or any one of them may under equity compel a division to be made. See COPARCENARY.

Common Bench. See BENCH and COMMON LAW, *Courts of.*

Common Counts, short statements of the cause of an action made in a Declaration (q. v.).

Common House, or **Common Room,** was an apartment in a monastery, presided over by a monk, called the *master.* A fire was constantly kept in it for the benefit of the monks, who were not usually allowed to have one anywhere else.

Common Law. The laws of England, like those of most countries, are largely regulated by customs resulting from experience, and confirmed by judicial decisions. Law so constituted is called C. L. It is to be distinguished from law created by statute (see ACT OF PARLIAMENT, STATUTE), and also from law as created or modified by Equity (q v.). C. L. is overruled by statute law, and may be set aside or modified by equity, except in matters criminal. These involving public security, no judge can be allowed to administer them otherwise than according to the letter and to established authority. 'Immemorial usage' in C L. does not refer to a period so remote as to be beyond historical record. The bounds of legal memory are limited by 3 Edward I. to the beginning of the reign of Richard I., from which time an uninterrupted custom acquires legal validity. But as this rule has often been productive of injustice, it has been provided by statute that thirty years' enjoyment shall constitute a right of Common (see COMMON), and that after sixty years the right is absolute. In claims of right of way, the periods are twenty and forty years. (See PRESCRIPTION IN LAW.) The civil and canon laws form branches of the unwritten or C. L. which, under different restrictions, have been adopted in the Ecclesiastical Courts, the Courts of Admiralty, and the Chancellor's Court of the University of Cambridge. Decisions of courts being the best evidence of what the C. L. is, are held in high regard, and are preserved as authentic records in the several courts. In Scotland, the term C. L. is used by many of the writers, and in some of the Acts of the Scotch Parliament, to signify the Roman law. But in Scotland, as in England, the proper meaning is the consuetudinary law, from whatever source derived.

Common Law, Courts of.—The *Court of Queen's Bench* is the Supreme Court of the C. L. in England. It consists of a chief justice and of four *Puisne* judges. It keeps all inferior jurisdictions within bounds of their authority, and may remove the subject of their proceedings so as to be determined by itself. It controls all civil corporations in the kingdom. It takes cognisance of both criminal and civil cases. It is a court of appeal, to which may be removed determinations of the Court of Common Pleas, and of inferior courts of record in England. Indictments removed into this court may be tried either *at bar*, that is, at the bar of the court, during term, or at Nisi Prius (q. v) by a jury of the county out of which the indictment is brought, the court itself being the principal court of criminal jurisdiction in the kingdom. Indictments moved into the Queen's Bench the court may order to be tried at the Central Criminal Court.

The *Court of Common Pleas*, like the other courts of Westminster, has jurisdiction throughout England; but it has no cognisance of crimes, or of matters of a public nature. There is one chief judge and four petty judges. They sit every day during the four terms to hear and determine all matters of law arising in civil causes. These the court takes cognisance of originally as well as on removal from inferior courts.

The *Court of Exchequer* is held before the Chancellor of the Exchequer, the Chief Baron, and four *puisne* Barons. The chief business of the court was formerly to take cognisance of matters connected with the public revenue, though by a fiction of law, common to this court with the Court of Queen's Bench, all personal suits may be prosecuted in the Court of Exchequer. It was at one time a court of equity, but by 5 Vict. c. 5, its jurisdiction in equity was transferred to the Court of Chancery. But it retains all other powers which it previously possessed.

The above constitute the superior courts of common law. They sit at Westminster, and are commonly called *The Courts at Westminster.* They have been consolidated by the Acts of 1873 and 1875. (See COURT OF JUDICATURE, SUPREME, ACTS.) There are also inferior courts of common law, the only important one of which is the County Court (q. v.), to which the corresponding court in Scotland is the Sheriff Court (q. v.). There are the Borough Courts under the presidency of the Recorder (q. v.). See MAYOR'S COURT OF LONDON, STANARIES.

Common-Law Bar.—That portion of the English bar which devotes itself to practice before the Common Law Courts is so termed.

Common Prayer, the Book of, is the liturgy of the Church of England and Ireland. Till the time of the Reformation there was no such book in the vernacular, the only thing of the kind being the Latin liturgy, originally derived from the Gallican (see LITURGY), and revised by the Bishop of Salisbury, 1085. During the reign of Henry VIII., in 1537, Convocation published a book entitled *The Godly and Pious Institution of a Christian Man*, and containing the Lord's Prayer, 'Ave Maria,' Creed, Ten Commandments, Seven Sacraments, &c. Of this a second edition was published in 1540, under the title of *A Necessary Doctrine and Erudition for any Christian Man.* These, however, were more of the nature of a confession of faith than a liturgy; but the same year a commission was appointed to reform the rituals and offices of the Church, and the next year the prayers for processions and litanies were ordered to be translated into English and publicly used. In 1545 the *King's Primer* was published, containing the whole morning and evening prayer very nearly the same as in the present B. of C. P. In 1547, under Edward VI., a committee of divines was appointed, who composed, first, a *liturgy* proper, or order for the Communion (1547), and then public offices for Sundays and holy-days, and for Baptism, Confession, Matrimony, Burial, &c. This liturgy was approved by Convocation, and confirmed by Parliament and the King, 1548. To obviate certain objections, the book was revised under Archbishop Cranmer, when the Sentences, Exhortation, Confession, and Absolution were added at the beginning of the morning and evening services, the Commandments were added at the beginning of the Communion office, and some rites and ceremonies considered idolatrous were removed; and thus revised, it was again confirmed by Parliament, 1551. Interdicted under Mary, it was again introduced, with slight alterations, under Elizabeth. Nothing more was done till after the Hampton Court conference under James I., when some trifling alterations were made, such as the adding of some forms of thanksgiving at the end of the Litany, and an addition to the Catechism regarding the sacraments. After the Restoration, at the instance of the Presbyterians, another revisal was made, the chief alterations then made being that the Epistles and Gospels were taken out of the authorised version of the Bible, and that the office of Baptism for those of riper years and the forms of prayer at sea were added. The B. of C. P. as it now stands was then approved by Convocation, 1661, and confirmed by Parliament next year. See *Annotated Book of Common Prayer* (1875), and *An Introduction to the History of the Successive Revisions of the Book of Common Prayer* (Parker & Co., Lond. 1877).

Commons. The dinner of members in colleges and inns of court is so called. There are separate tables for the Benchers (q. v.), for the barristers, and for the students and other members.

Commons, House of. See PARLIAMENT.

Common Sense, the Philosophy of, was the name given by Dr Thomas Reid to the theory by which he hoped to avoid the sceptical conclusions which Hume had drawn from the idealism of Locke and Berkeley. The scepticism of Hume had indeed no connection with, but was opposed to, the idealism of Berkeley strictly so called, viz., the substantial existence of the ideal world in an all-perceiving mind; but it was undoubtedly founded on what has been called the representative theory of Locke, as extended by Berkeley to the primary qualities of matter. The general statement of Reid was that there are in the mind certain self-evident principles which cannot be proved by any arguments, but which must be accepted as the ultimate grounds of certainty. General acceptance, and the impossibility of explaining them by early training or false reasoning, may confirm this view, but the authority of these principles lies in the simple consciousness of them. They are either *Contingent;* for example, 'those things do really exist that we distinctly perceive by our senses;' the probable uniformity of nature; 'there is a certain regard due to human testimony in matters of fact:' or *Necessary,* consisting of grammatical, logical, mathematical, moral, metaphysical, and æsthetic principles; for example, every proposition is either true or false; whatever begins to exist must have a cause. This procedure of affirming with regard to every unexplained mental fact not merely that it could not be explained, but that it was unscientific to attempt its explanation, had already been adopted by Père Buffier, who declared that, among others, it was the deliverance of C. S. that 'my soul produces motions in my body;' a proposition which is declared to be inconceivable by some modern physiologists. The C.-S. philosophy was largely modified by Dugald Stewart, who introduced the phrase 'Fundamental Laws of Belief,' but it owes its final statement to Sir W. Hamilton. On the leading question of a belief in an external world, he says: 'We are immediately conscious in perception of an ego and a non-ego, known together and known in contrast to each other. This is the fact of the *duality* of consciousness.' This view he calls Natural Realism. All other views, Nihilism, Idealism, Materialism, &c., he declares to proceed on the non-recognition of this ultimate *dualism,* or primitive incomprehensible belief that a material world, solid and extended, exists, and that a perceiving subject also exists. Hamilton's doctrine of C. S. on this question is therefore quite different from the 'irresistible suggestion' of an external world which Reid declared to follow upon sensation. On other points Hamilton accused Reid of having, like Beattie and Oswald, regarded C. S. as an appeal to 'the undeveloped beliefs of the unreflecting many.' C. S. requires strict *universality* and *necessity* as well as *incomprehensibility* or *simplicity* in its principles. Necessity may be the result of a power or of an impotence of the mind. The Cartesian *cogito, ergo sum,* and the intuitions of space and time, are examples of the former; the law of the conditioned as applied to the notions of causality and moral freedom and substance affords examples of the latter.

Common Time, in music, is a rhythm in which strong and weak accents occur alternately, each bar or measure usually taking either the form strong, weak, or the form strong, weak, medium, weak. These primary subdivisions may be indicated indifferently as crotchets, quavers, or minims, the first being by far the most common, and having the time signature $\frac{4}{4}$ and $\frac{2}{4}$ or 𝄵. Each of them may be again subdivided into two or four parts, the relative accentuation of which is the same as that of the primary subdivisions. Rarely these secondary subdivisions are *three* in number (*i.e.,* each crotchet is divided into three quavers, &c.), in which case the rhythm is really changed into what is known as Compound C. T. (q. v.).

Commu'ni Dividen'do Ac'tio, in Roman law, was an action for the division of what was possessed in common by two persons or more. The principles of the Roman law on this subject are adopted in the law of Scotland. See COMMON PROPERTY, COMMON TENANCY, &c.

Commun'ion, or **Holy Communion,** is one of the names given to the sacrament of the Lord's Supper, doubtless derived from the language of Paul in 1 Cor. x. 16, 17, although he does not call the sacrament by the name of C., but only says what it is or does. C. also meant the fellowship of the Church, expulsion from which, therefore, was called 'excommunication.'

Communion Elements (in law). In Scotland, in a process of Augmentation (q. v.), the court may allow for C. E., payable out of the Teinds (q. v.) of a parish.

Communion Service. See COMMON PRAYER, THE BOOK OF, and LITURGY.

Commu'nis Err'or, a term of Scotch law, denoting the prevalence of an erroneous practice, which practice has been relied on. The Court of Session, in case of C. E., generally pass an Act of Sederunt (q. v.) requiring observance of correct practice for the future, but without decision which might disturb past judicial procedure.

Comm'unism means the negation of private property: it describes a society in which the land and instruments of production would be held as joint property, and used for the common account, industry being regulated by a magistrate, and the produce being publicly divided in equal shares, or according to wants, or on some other principle of distributive justice. Socialism does not involve necessarily the abolition of private property: it merely insists, as in St Simonism and Fourierism, that the land and instruments of production should be the property of the association or of the Government; as was the case in the original Teutonic 'mark' and Indian 'village-community,' and would be partially the case if the state were to appropriate the 'unearned increment' of rent—*i.e.,* the increase of rent due, not to expenditure of capital, but to the fact of inferior soils being forced into cultivation by the pressure of population. Of C., on the other hand, the monasteries and the Moravians give examples on a small scale. In most cases, however, as with the Essenes of Palestine, the American Shakers (except the Inspirationists of Amanda and the Separatists of Zoar), the American Harmonists and Rappists at Economy and Beaver Falls, marriage is entirely given up, the society being recruited from converts or from adopted children. Robert Owen, on the other hand, the Scotch Communist, who founded the abortive experimental communities of Orbiston in Lanarkshire (1823) and Harmony Hall in Hampshire (1843), connected with his C. a scheme of selection and alternation in the family relations, by which the human character (believed by Owen to be wholly the product of education and not of heredity) was to be indefinitely modified into a form which would then be the natural support of C. This idea, found also in the *Republic* of Plato, is not characteristic of C., which, in the economical sense, was advocated by Louis Blanc, Cabet, and Proudhon: these men would not have admitted the 'mobility of the affections,' on which the projects of St Simon, Fourier, and Enfantin were based. It is objected to C. that individuals would be tempted to shirk work. But under the present social system most work, even superintendence, is done for fixed wages or salaries—a state of things which would no doubt be altered by the general adoption of piece-work and the association of workmen in profits. C. would have as many checks against laziness and fraud as the present system. Nor, although marriage has been renounced by some Communists, does there seem much ground for supposing that, if it were retained, the society would unduly multiply. It is difficult to conjecture the force and direction of public opinion on such a matter. But the real difficulties in the way of C. are the distribution of employments and their remuneration. Here the actual inequality of human beings comes strongly out. If the subdivision of labour is to be maintained, the selection of work cannot be a matter of indifference. Then, are wages to be exactly the same for the teacher of science and the hodman, who both honestly do their '*possible*'? This Blanc calls 'the point of honour of industry;' and Cabet, 'fraternity.' No doubt, all the motives to great exertion, except the desire of money and what money commands, would remain, and many false and degrading motives would be starved out; but would humanity not still heap wealth, as well as honours, upon its heroes? The differences of remuneration between a statesman, a physician, and a bricklayer, are no doubt to some extent based on erroneous conceptions of social dignity and on the differences of preliminary outlay; and these would partly disappear under a system which made education gratuitous and universal, and which converted private profession into public service. We have no example of a Communistic society with the fundamental institution of marriage. The American

Shakers are successful economically, but the members become dull and stupid, and are unable properly to train the adopted children. The *ateliers* or national workshops of the French Revolution of 1848, as that of the tailors at Hôtel Clichy, failed from want of management. The bonus-paying concerns of Leclaire (painters), Dupont (printers), Briggs (colliers), have not been very successful. Of 180 associations formed on Blanc's principle, only ten subsisted in 1867. The Communist societies, such as the Travailleurs Egalitaires and the Communistes Revolutionnaires, which had much to do with the French Revolution of 1848, and were represented in the Provisional Government, are now probably swallowed up in the 'International.'

Commun'ity. Voluntary associations have no *persona standi in judicio*, but by special statute it is made lawful to establish societies for raising funds to relieve and maintain members during sickness, and to provide burial. (See BENEFIT FRIENDLY SOCIETIES, BUILDING BENEFIT SOCIETIES.) Joint-stock banks may by statute sue and be sued in the name of their principal officer, on certain conditions prescribed in the statute. See CORPORATION, JOINT-STOCK COMPANY.

Commuta'tion of Small Penalties The Act 28 and 29 Vict. c. 127, provides a scale of equivalent terms of imprisonment for failure to pay penalties between 10s. and £5.

Commutation of Tithes. See TITHES.

Comne'nus, the family name of a dynasty of Byzantine emperors (1057-1204) and of emperors of Trebizond (1204-1461). See BYZANTINE EMPIRE, section headed *The Comnenian Dynasty;* also Christian names of individual rulers—*e.g.*, ALEXIUS COMNENUS, ANNA COMNENA, &c.

Co'mo (anc. *Comum*), a city in the province of the same name, N. Italy, and connected with Milan by railway, is situated at the S.W. extremity of Lake C. (q. v.), in a beautiful valley, encircled by hills and clothed with groves of olive and chestnut. The city itself is ill-built and filthy, but the suburbs contain some magnificent palaces and imposing public buildings. C. is surrounded by double walls, pierced by four gateways, splendid specimens of the military architecture of the middle ages. The Byzantine cathedral (1396) is faced with white marble, and contains some interesting monuments. Iron foundries and marble quarries are in the vicinity; there are manufactures of silks, woollens, hosiery, gloves, and soap; and a considerable trade is carried on with Italy and Switzerland by means of the lake. Pop. (1872) 24,350 C. was the birthplace of the younger Pliny, who enriched it with public works, a library, and other institutions.

The *Lake of C.* (Ital. *Lago di Como*, Lat. *Larius Lacus*) lies at the foot of the Alps, 700 feet above the level of the sea. It is 35 miles long, with a breadth nowhere exceeding 3 miles, but generally considerably less, and a depth of from 40 to 600 feet. The lake is formed by the river Adda, and divided in its southern portion into two great arms by the rocky peninsula of Bellagio. The scenery is singularly beautiful; hence the lake is much visited, and is traversed in all directions by steamers. The younger Pliny, who had several villas on its banks, speaks of it with much affection.

Comodo', an island of the Malayan Archipelago, in the Strait of Sapy, between the islands of Sambawa and Flores. It is 35 miles long, with an average breadth of 16 miles.

Com'orin, Cape, the S extremity of Hindustan, a low sandy point, invisible to the mariner till he is within 10 or 12 miles of it. Eighteen miles behind it is the Peak of C., a picturesque rounded eminence of the Western Ghauts, which serves as a beacon to the passing ship.

Com'orn. See KOMORN.

Com'oro Isles, a group of four large and four small islands of volcanic origin, in the middle of the N. entrance to the Mozambique Channel, between Madagascar and the E. coast of Africa. They were discovered by Houtman in 1598. The names of the larger ones are Angaziya or Great C., Mohilla, Mayotta, and Anjouan or Johanna. They rise to a great elevation, and can be seen at a distance of from 50 to 60 miles. The soil is fertile, and a tropical vegetation is everywhere seen—cocoa and areca palms, fine timber for shipbuilding, yams, bananas, mangos, ananas, citrons, &c. Rice, maize, cotton, indigo, and sugar are cultivated. The inhabitants are a mixed race of Arab and African descent, the majority being Mohammedans. Great C. has an area of 510 sq. miles, and a pop. of 30,000. Mayotta has been a French possession since 1848, and is valuable for the production of sugar. Johanna, the most picturesque and prosperous of the four, is a favourite victualling place for ships.

Com'panies' Clauses Consolidation Act. See RAILWAY ACTS.

Company. See JOINT-STOCK COMPANY, PARTNERSHIP.

Company of a Ship includes all persons engaged in the working and management of the affairs of a ship, officers as well as Crew (q. v.).

Compar'ative Anat'omy. See ANATOMY.

Compar'ison, in grammar, is the name given to the mode of marking the degree in which a quality is attributed to an object. It is customary to say that there are three degrees of C., *positive, comparative*, and *superlative*. Exception may be taken to this division on the ground (1) that the 'positive' does not *express* though it may *imply* C., and (2) that the kind of C. which it implies is quite different from that which is expressed by the second degree. Similar objections may be urged against calling the third or highest degree one of C. Admitting that the phrase 'degrees of quality' would be more logical and more simple than 'degrees of C.,' little or no harm can ensue by retaining a nomenclature which is easily interpreted by common sense. In English, German, and some other languages, there are two ways of expressing these degrees—(1) By inflection, which is the prevalent mode in Greek and Latin, as *bright, brighter, brightest;* (2) By using another word expressive of increase or decrease of the quality, as *conspicuous, more* (or *less*) *conspicuous, most* (or *least*) *conspicuous*. The former mode is preferred in words of one syllable, or in words of more than one where euphony would not be impaired. As a rule, it is only adjectives of quality that can be compared, and not all even of these Such as express a quality not admitting of degrees—*e.g.*, *round, square, whole*, &c. – cannot be compared.

For C. in rhetoric, see FIGURES OF SPEECH and SIMILE.

Com'pass, an instrument for indicating the magnetic meridian at any locality. As this meridian lies in a generally N. and S. direction, the C. is of special use in giving bearings of any object from a fixed place, and is of invaluable service to the mariner and traveller as a guide over unknown regions. All such instruments consist essentially of a magnet suspended so as to have as complete freedom of motion in azimuth as possible. The *Mariner's C.* is familiar to all, the only portion visible from above being the large circular card which is attached to the bar magnet, and marked with the so-called *points* of the C. Each quadrant contains eight points, which are named according to the following plan:—Beginning at N. and going towards E., we read N., N. by E., N.N.E., N.E. by N., N.E., N.E. by E., E.N.E., E. by N., E.; and the other quadrants are divided in precisely a similar manner

The magnetic needle is subject to a variation with latitude, owing to the non-coincidence of the magnetic and geographical poles, so that it usually points to the W. or E. of the true N. This deviation is easily corrected; but a much more irregular deviation is produced by the reaction of the ship's iron upon the magnet. Various schemes have been proposed to remedy this, such as fixing the needle at the mast-head, thus reducing the action to a minimum, or by using two parallel magnets. The method employed in the British navy at present is to have the C. at a sufficient elevation above the bulwarks, so as to allow of it having an uninterrupted sweep of the horizon. By setting the vessel in the various directions, the variations of the needle may be obtained and tabulated for future use. Sir W. Thomson has shown that if two masses of soft iron, large in comparison to the size of the needle, be placed at opposite sides of the magnet, the effect of other more distant portions of iron will be very small indeed; and accordingly he has recently constructed a very sensitive C., differing from those ordinarily in use at sea in not having the card fixed to the needle or needles, which are here not more than 1½ inch in length, and which are as nearly dead-beat as they could be wished, and in having two spheroid masses of soft iron fixed close beside the double needle.

Compass'es, instruments for measuring and transferring distances. The *Common C.* consist of two legs, joined together at one end by a pivot-joint, and may be used for describing circles. The *Beam C.* serve the same end, but are more accurate, and better capable of measuring greater distances. The points slide along a straight beam, and are clamped securely at the required distance. *Proportional C.* have two pairs of opposite legs, whose lengths, and therefore the distances between the points of each pair, can be altered to various proportions.

Compass'ionate Allow'ance. Certain annuities to children of deceased British military and naval officers, given by the state, are so called. They are tenable by boys up to eighteen years of age, by girls till twenty-one or marriage. They range from £8 to £20 per annum. A special C. A. was granted in 1855 and 1856 to the widows and children, or, in some cases, to other specified relations, of military officers killed in the Crimean war.

Com'pass Plant (*Silphium laciniatum*), a plant of the western prairies of America, so called because it is said to turn the faces of its leaves uniformly in a N. or S. direction; 'the leaves on the developed stems of the flowering plants taking rather an intermediate position between their normal arrangement on the stem and their peculiar meridional position. The settlers, when lost on the prairies on a dark night, get their bearing by feeling the direction of the leaves' (Brown). The reason of this is, that owing to the Stomata (q. v.) being more equally distributed on both sides of the leaf than is usual in other plants, both sides are equally sensitive to light.

Compear'ance, a term of Scotch law, denoting the appearance made for a defender in an action.

Compearer.—Any one not called in an action in Scotland may *compear* and claim to sist himself on the ground of having an interest in it. If his claim is sustained he is called a C.

Compensa'tion, in physics, a method for eliminating or neutralising unavoidable errors, by introducing others equal but opposite. See PENDULUM and BALANCE-WHEEL for common instances.

Compensation, in law. Where two persons are indebted to each other, their debts, if equal, are held by law to extinguish each other; if unequal, to leave only a balance due. In England the allegation of trespass or wrong done by the plaintiff cannot be pleaded by the defendant in an action as a *set-off* against the claim of damage. The defendant's remedy must be by a cross action. This is greatly the doctrine of Scotch law also.

By a legal anomaly no action used to be maintainable against a person who, by wrongful act or negligence, caused the death of another, while the offender was liable if the sufferer was merely hurt. But this defect has been remedied by Lord Campbell's Act, which provides that any one who has caused the death of another, even under circumstances which make the offence felony, shall be liable in damage at the instance of the executor or administrator of the deceased for behoof of the wife, husband, parent, or child. The action must be begun within twelve months after death.

Com'petent and Omitt'ed, a Scotch legal phrase denoting pleas which might have been maintained in a suit, but which have not been stated. The Court of Session may reduce their own decrees on the emerging of any new fact or writing, unless statement or production has been wilfully omitted to protract litigation.

Competi'tion (which, like its French equivalent *concurrence*, suggests the idea of a struggle for a prize) has been denounced by socialists as a principle of social disorder, and lauded by optimist writers in political economy as the force which overrules private interest for the general good. Practically, however, C. may be best described as the absence of restriction upon individual judgment in industrial affairs. The restriction may be enforced by either law or custom. Thus the usury laws (demolished in this country by Bentham) prohibited the taking of interest beyond a certain rate; the land-custom of India fixed the rent payable for occupancy. In fact, only in modern times has free C. under contract generally superseded the rule of *status* and custom among advanced nations. Another form of C. which was frequently either excluded or hampered by treaty was that between different countries in the same market. Either the privilege of exclusive importation was conceded to a favoured colony or neighbour, or native industry was bolstered up by prohibitory duties on importation. But no more striking change has taken place than with respect to wages, which were formerly regulated either by statute or statutory magistrates, but are now fixed by agreement between capitalists and trade societies, both parties looking to the actual and probable state of trade. Some of these restrictions were no doubt suitable to a stationary society isolated from other societies, but with regard to them all, there is no doubt that they were incompatible with the progressive movement in industry and trade which has marked the last century. Each country devoting itself to the department in which it has either the 'greatest superiority or the least inferiority;' each producer endeavouring by ingenuity or economy to secure a sale by furnishing his commodity at a less cost to society; each capitalist bidding for the labour he requires, and bidding more highly for the more skilled labour; such is the picture presented by perfect C. As Bastiat says, its tendency on the whole is to give every one a larger share of the 'gratuitous utility' of nature, by the advantages which science and invention have attained from nature. But this ideal C. nowhere exists. Manufacturers and traders combine to preserve prices and to sink wages; in particular industries and particular nations enormous vested interests oppose the introduction of new methods; trades unionism endeavours to identify the individual workman with his class. It is therefore equally unjust to ascribe to C. the great achievements of modern industry, and to charge it with the evil results of modern civilisation. The absence of public regulation has assuredly not created the skill, the perseverance, the enterprise which have founded so many trades, nor is it responsible for the prevalence of commercial dishonesty or for the fact that population presses closely on the means of subsistence. On the other hand, the experience of the national *ateliers* of Paris, and the history of the experimental communities founded on socialistic principles, do not suggest that any scheme for public regulation of prices and wages would be at present practicable, or anything but disastrous. It is only where, as in the case of railway and gas companies, &c., a practical monopoly in a district exists, that the state can wisely even specify a *maximum* price or a *maximum* profit. The evils attending on C. can only be removed by the old-fashioned and unpleasantly slow remedy of making people wiser and better than they are.

Compiègne (Lat. *Compendium*), a town in the department of the Oise, France, on the left bank of the Oise, a mile below its junction with the Aisne, and 60 miles N.N.E. of Paris by railway. Pop. (1872) 10,353. Boatbuilding, hosiery, rope-making, are among the principal industries; and there is a trade in coal, wood, and grain. The chief edifice is the palace, originally built by St Louis, and rebuilt by Louis XIV. Here, on March 27, 1810, Napoleon I. received his bride, Maria Louisa, Archduchess of Austria. It was also a favourite hunting-seat of Napoleon III., and is surrounded by a vast park. Joan of Arc was made prisoner before the walls of C. in 1430.

Com'plement, the amount by which a given magnitude falls short of some fixed magnitude. Thus the arithmetical C. of a number is the difference between it and the next higher power of ten; the C. of an angle or arc is the amount by which it falls short of a right angle or a quadrant; the C. of a common logarithm is found by subtracting it from ten.

Com'pline. See CANONICAL HOURS.

Compo'nee, Compony, or **Gobony**, in heraldry, is a term describing the field of any charge divided into a single row of small squares, alternately a metal and a colour. When there are two such rows, the field is said to be *counter-C.*; when more than two, it is *Checky* (q. v.).

Compos'itæ, Synanther'eæ, or **Aster'aceæ**, the most extensive natural order of Dicotyledonous plants, belonging to the subdivision *Corolliflora* (or, according to others, to the *Calyciflora*), herbs or shrubs, universally distributed. In the northern regions these plants are all herbaceous, but in the southern hemisphere they are occasionally shrubby or even arborescent. There are now 9000 species known. They have been usually divided into the following sub-orders:—(1) *Tubulifloræ*, most abundant in hot climates. *Senecio*, Daisy, &c., are good examples. (2) *Labiatifloræ*, almost entirely confined to the extra-tropical

regions of S. America. *Mutisia* is an example. (3) *Liguliflora*, most abundant in cold countries. The Chicory (q. v.) and Dandelion (q. v.) are examples. Their properties are variable, though it may be said that the whole order is pervaded by a bitter principle, so that most of them are tonic. Some possess laxative and anthelmintic properties; others, owing to the presence of a volatile oil, are aromatic, carminative, and diaphoretic. Acrid stimulative qualities are possessed by others, while most of the *Liguliflora* abound in a milky juice, which is bitter, and sometimes narcotic. To enumerate all the economic plants of this great and important order would be impossible within our space. Wormwood (q. v.), Chamomile (q. v.), Elecampane (q. v.), Tussilago (q. v.), Arnica, &c., are among the medicinal plants furnished by it. The Artichoke (q. v), salsafy, endive, lettuce, &c., are eaten. The safflower and sawort supply dye-stuffs. The sirrehout (*Tarchonanthus camphoratus*) of the Cape of Good Hope furnishes a close-grained beautiful wood, valued by cabinetmakers.

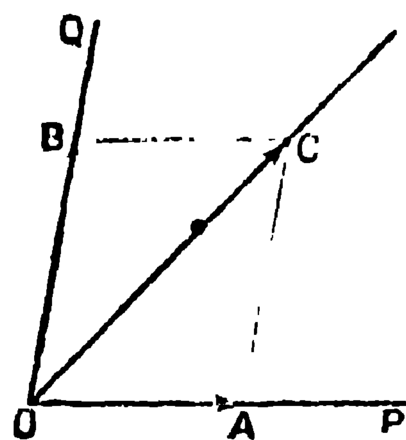
Composite Orders (in architecture). See COLUMN.

Composi'tion. The creditors of an insolvent person are said in law to accept of a C. when they agree to give him a discharge in full, on his paying them a part instead of the whole of the debt he owes them. In England, the creditors of one who is insolvent may, without any proceedings in bankruptcy, resolve to accept a C.; but, to make the resolution binding on the minority, it must be carried by a majority in number and three-fourths in value of the creditors, at two meetings convened in a prescribed manner. In Scotland, no creditor can be compelled to accept a C. until the bankrupt has been examined under sequestration. Acceptance of C. by creditors discharges the bankrupt and reinvests him in his estate. He remains liable for the C. only. All preferences and collusive agreements for concurring in settlement by C. are void, and under the Scotch Act a creditor who has obtained any preference, or accepted any payment for his consent, is liable to the loss of his claim, and to repayment of double the value of the preference or payment which he has accepted. See BANKRUPTCY.

Composition to a Superior is the name given in Scotland to the entry-money paid to the Superior (q. v.) by a Singular Successor (q. v.). The amount of the C. is sometimes fixed, or taxed, as it is called, in the original charter; when it is not so, the superior is entitled to a year's rent of the subject.

Composition, in art, is the arrangement of the figures or objects of a picture, or of the different members of a group in sculpture, or of the lines of a single figure in painting or sculpture, which is found best at once to impart emphasis to the prominent idea of the work, and to supply a fitting environment of harmony and grace.

Composition and Resolution of Velocities and Forces constitute the most important and fundamental principles of dynamical science. Suppose a body to receive an impulse in a northerly direction, which would produce a velocity of 10 miles an hour; and suppose it further to receive a simultaneous and equal impulse in an easterly direction; the question immediately arises, In what direction and with what velocity will the body move? At the end of an hour the body will obviously have proceeded 10 miles N. and 10 miles E.; and therefore it will have travelled in a N.E. direction with a velocity of $10\sqrt{2}$ miles an hour. This principle is easily extended to the general case of any two velocities making any direction with each other. Let O A and O B represent in direction and magnitude two velocities, which are communicated simultaneously to a body at O; then it appears by a simple inspection of the figure, and a knowledge of Newton's first law (see MOTION, LAWS OF), that the body will move with a velocity represented in direction and magnitude by O C, the diagonal of the parallelogram whose sides are O A and O B. O C is termed the *resultant* of the two *component* velocities O A and O B. The reverse problem, to *resolve* a given velocity in two given directions, follows as an immediate deduction from this. Thus, to resolve O C along O P and O Q, we have simply to draw through C, C B and C A parallel respectively to O A and O B. Forces are compounded and resolved in precisely the same way, as is at once deducible from Newton's second law, that 'change of motion is proportional to the impressed force, and takes place in the direction of the straight line in which the force acts;' and accordingly we may take O A and O B as representing in direction and magnitude the forces which produced these velocities. Hence the resultant force is what would produce the resultant velocity O C, therefore is represented by O C in both direction and magnitude. See VELOCITY.



Compos'itor. See PRINTING.

Com'pos Men'tis. See INSANITY.

Compostell'a, Order of St James of, a Spanish order of knights, founded at Santiago de C., in the N.W. of Spain, and sanctioned by the Pope in 1175. The original founders were thirteen noblemen in conjunction with the canons of St Eloy; and their immediate object was to protect against the Moors the numerous pilgrims who visited C. in honour of the relics of St James the Elder, patron of the city and of Spain, which were believed to be built into the foundations of the cathedral. The affairs of the order were controlled by a council of thirteen, and vows of poverty, obedience, and celibacy were taken by the members; but the order being entitled to retain whatever was won from the Moors, its wealth became enormous; and its power grew so formidable as to excite the fears and jealousy of the crown. The Pope accordingly transferred the grand-mastership of the order permanently to the crown in 1522, which led to a rapid decline of its importance.

Com'posts, a kind of manure consisting of lime, earth, and organic refuse matter gathered into a heap to promote fermentation or decay, the mass being turned over at regular intervals to render it homogeneous before transferring it to the land. C. available for one or more of the cultivated crops may be made with all kinds of farm refuse, as potato-haulms, weeds, leaves, hedge clippings, as well as scourings of ditches, road scrapings, &c., mixed with lime, in the proportion of one load of lime to five loads of refuse. The refuse of manufactures, as wool and flax waste, hair and horn clippings, soap waste, ammoniacal liquor, &c., mixed with earth, constitutes excellent C.

Com'pound An'imals, the name given to animals which are composed of a greater or less number of distinct forms. The included organisms of a compound animal—of which the Tapeworms, *Polyzoa* (q. v.), or Sea-mats, the *Hydroid* zoophytes, and the compound *Tunicates* (q. v.) form good examples—are termed *zooids*, whilst the entire compound form, however numerous its zoöids, is itself named the *individual*. Any *individual* animal in zoology is defined as the result of the *total* development of a *single* egg. Whatever a single egg gives rise to is an individual, and this latter may be *simple*, or consist of one animal, as in higher forms; or be *compound*, as in the examples given. The compound form at first consists of a single *zoöid*, which by a process of *gemmation* or budding gives rise to the compound organism.

Compound Common Time, in music, is a rhythm in which the primary subdivisions of each bar are accented as in Common Time (q. v.). Each of them, however, is indicated (in ordinary musical notation) by a dotted crotchet, minim, or semibreve—generally the former (for which the time signature is $\frac{6}{8}$), and is subdivided into three parts, which have the relative accentuation:

Strong. Weak. Weak.

Each of these secondary subdivisions becomes, according to the notation of the primary, a quaver, crotchet, or minim, and are frequently again subdivided into two parts, upon the first of which the stress falls.

Compound'ing of Fel'ony, or Theft Bote. When one who has been robbed takes back the article stolen on an agreement not to prosecute, he is guilty of C. of F., and is punishable at common law by fine and imprisonment. By 24 and 25 Vict. c. 96, if any one advertise a reward for the return of any property '*lost or stolen*,' and in such advertisement use any words purporting that *no question will be asked* regarding the person producing the missing property, or as to how it came into his possession, he, as well as the printer and publisher of the advertisement, is liable in a penalty of £50, with costs, at the instance of any one suing for the same. By a subsequent Act, no action

for the penalty can be raised without concurrence of the Attorney or Solicitor General. Any one taking a reward for helping the owner to recover stolen property, unless he cause the thief to be brought to trial, is guilty of felony.

Compound Interest (in arithmetic). See INTEREST.

Compound Interest, in law, or interest with *Annual Rests,* is never allowed on the sum in the original obligation or agreement; but there is commonly a posterior contract to accumulate interest and make it a principal bearing interest. This is the general rule of law; but in cases of hardship, annual rests may be allowed, and the House of Lords is empowered by statute to allow C. I. on appeal from Scotland, if it shall think fit to do so.

Compound Triple Time is a rhythm bearing the same relation to Triple Time (q. v.) that compound common time (above) bears to common time. Its primary subdivisions are generally noted either as dotted minims or crotchets, for which the time signatures are respectively $\frac{9}{4}$ and $\frac{9}{8}$.

Compressed-Air Bath, an apparatus invented by M. Laburé of Paris in 1832, and since introduced into Ben-Rhydding and other hydropathic establishments, which is efficacious as a cure for asthma, bronchitis, phthisis, &c. The increased pressure of the atmosphere produced by its means seems to invigorate the lungs, compelling them to more rapidly perform their functions of inhalation and exhalation, and thus to purify the blood and restore the body, and especially the breathing organs, to a healthier and more natural condition.

Compressibil'ity, one of the properties of matter, in virtue of which a body is diminished in volume under increased pressure. It is usually accompanied by evolution of heat, and in such cases the application of heat is attended with expansion. All gases are easily compressible, but the name *compressible* gas is restricted to such as have been compressed to the liquid state. Liquids for long resisted all attempts at mechanical compression, and their C. is exceedingly small, being measurable only by the most refined processes. Solids present various degrees of C., but its existence proves either that matter is porous, or that the ultimate particles are capable of compression, the former at any rate being probably true.

Compris'ing, the same as *Apprising* (q. v.).

Com'promise, in English law, is understood to be a mutual promise of parties to submit matters in dispute to arbitration. In Scotland the analogous terms are *Submit* and *Refer.*

Compto'nia, a genus of Deciduous bushy shrubs belonging to the natural order *Myricaceæ,* natives of N. America, and named in honour of Henry Compton, Bishop of London about the year 1714, and the introducer of many exotic plants into England. *C. asplenifolia,* known in the U.S. as the 'sweet fern,' is employed in that country as an astringent and tonic in diarrhœa. In France it is sometimes called *Liquidambar à feuilles de Ceterach,* though it has no connection with the true Liquedambar (*L. Styrocifiua*).

Compul'sion. Acts done or rights granted on C., or under the influence of Force and Fear (q. v.), are reducible. (See REDUCTION.) It is a sufficient defence against a criminal charge that the crime was committed under C.

Computa'tion of Time. See DAY.

Computation of Time, in law. The question of whether or not a particular period of time has legally expired may have a most important effect on the rights of parties. Thus, in Scotland, where the granter of a deed challenged under the law of Deathbed (see DEATHBED, LAW OF) lived for fifty-nine days and three hours after executing the deed, the court held it to be reducible, on the ground that the law requires the granter to have lived for sixty days, without counting the day on which the deed was executed. This decision was affirmed by the House of Lords. Had the granter lived to the morning of the sixtieth day, the legal maxim, *Dies inceptus pro completo habetur,* would have been applicable, and the deed would have been good. There has been a decision in accordance with this principle.

Com'rie, a village and burgh of barony on the Earn, Perthshire, 20 miles W. of Perth, in one of the most beautiful districts of Scotland. Slight earthquake shocks are frequently felt here. An ingenious apparatus has been contrived and stationed in a covered building in the neighbourhood (1875) by which the force and direction of the shock is registered. C. has distilleries and some manufactures of woollens and cottons. Pop. (1871) village, 746; parish, 1911.

Comte, Auguste, the founder of the school of 'Positive Philosophy,' was born at Montpellier, 19th January 1798, of Catholic and royalist parents, and early gained a place in the *École Polytechnique* through his mathematical talent. Expelled from that institution for insubordination, he taught mathematics privately, became secretary to Casimir Périer, and from 1818-24 was associated with St Simon, who no doubt inspired him with the idea of reconstructing social order, expressed in the *Plan des Travaux Nécessaires pour Réorganiser la Société.* In 1824, in an essay in the *Producteur,* C. published his theory of progress from the military offensive *régime* through the military defensive to the industrial pacific; this, he said, depended on the transition from theological conceptions through the abstractions of metaphysics to positive conceptions. Spiritual reorganisation must be based on demonstrated truth, not on faith in the invisible. Next year he made an unhappy marriage, when he had only one pupil, General Lamoricière; and in 1826, before an audience containing Carnot, Humboldt, Poinsot, De Blainville, &c., he began that course of seventy-two lectures on Positive Philosophy, which was interrupted by his insanity. The course was resumed in 1828, and afterwards appeared in six elaborate volumes between 1830 and 1842. During that period he was in easy circumstances, but the character of his doctrines drove him from office and employment, and after receiving aid from M. Grote, Sir W. Molesworth, and other admirers for some time, he gave up working for bread, and lived for the rest of his days on an annual subscription from his disciples. In 1845 began his friendship with Mlle. de Vaux, which seems to have infused a depth and tenderness of moral and æsthetic feeling before unknown to his nature. This appears in his second great work, *Système de Politique Positive,* in four volumes, which appeared between 1851 and 1854, and still more in the *Catéchisme Positiviste* (1852). His latter years were full of religious mysticism, almost asceticism. He died 5th September 1857. The object of the Positive Philosophy has been described 'as the condensation of all knowledge into a homogeneous body of doctrine, capable of supplying a faith and consequently a polity.' The value of C.'s *Hierarchy of the Sciences* has been violently disputed among eminent *savans,* but with the exception of a few disciples (of whom Congreve, Bridges, Beesly, and Harrison are the most prominent in England), all have joined in condemning the artificial and prosaic ceremonialism which he wished to substitute for a religion growing naturally out of human devotional feeling. Thus the *Catechism* includes a Trinity, consisting of (1) Humanity or *Grand Être;* (2) Space, or *Grand Milieu;* and (3) the Solar System, or *Grand Fétiche.* This has been wittily called 'Catholicism *minus* Christianity.' On the other hand, his view of the sciences as abstract and concrete; his treatment of sociological questions as requiring a combination of historical generalisation with deductive reasoning from the truths of psychology; his warnings in the *Politics* against the dangerous notion of an indefinite power of variation in human nature, are entitled to great praise. Minor peculiarities of C.'s system are that he does not recognise psychology as a distinct science, because mental life is merely a counterpart of cerebral function, and introspection of consciousness is untrustworthy; and that he does not discuss the general subject of scientific evidence. Comtism, as a philosophy of knowledge, is widely accepted; as a practical faith, it is absolutely stationary. Littré, the author of the French dictionary, is certainly the most illustrious, perhaps the *only* illustrious name associated with the system. The four English disciples are, however, now engaged upon a translation of their master's large works. See Robinet's *Notice sur l'Œuvre et sur la Vie de C.* (Par. 1860), Littré's *C. et la Philosophie Positive* (Par. 1863), and *Lettres d'Auguste Comte à John Stuart Mill,* 1841-46 (Par. 1877).

Con or **Col** (Ital. 'with'), a word used often in music, as *C. fuoco,* with fire; *C. anima,* with spirit, &c.

Con'can, a maritime territory in the province of Bombay, now subdivided into the districts of Thana, Kolaba, and Rutnagiri.

Concave' and **Convex'**, two relative terms applied to curved surfaces; the former when an intersecting plane lies between the surface and the spectator, the latter when the plane lies on the further side. See LENS, MIRROR, OPTICS.

Conceal'ing Crime. To protect a criminal *after* commission of a crime, is an offence punishable arbitrarily; but where protection is given under an agreement entered into *before* commission, the concealer becomes an Accessory (q. v.). The equivalent term in Scotch law is *art and part.*

Conceal'ment of Preg'nancy. See BIRTH; PREGNANCY, CONCEALMENT OF.

Concentai'na, a town in the province of Alicante, Spain, 4 miles N.E. of Alcoy, with manufactures of linen and woollen fabrics, of soap, paper, and bricks, of wine, oil, and brandy, and a trade in cattle and grain. Pop. 6100.

Concen'tric circles and spheres are those which are described with the same centre. C. central curves and surfaces of the second order have the same foci. These latter possess many curious mutual properties, which are discussed in Salmon's analytical treatises.

Concep'cion, a city of Chili, on the right bank of the Biobio, near its mouth, with a pop. in 1875 of 18,277. Its port, Talcahuano, on the bay of C., is, after Valparaiso, the best in the republic, exporting largely hides, tallow, wool, and salted beef. In 1870 the imports amounted to £639,062, and the exports, not including produce shipped to other Chilian ports, to £270,160. The *province of* C. has an area of 3589 sq. miles, and a pop. (1875) of 151,365.

Concep'tion, in metaphysics. See IDEA.

Conception, Immaculate. See IMMACULATE CONCEPTION.

Conception of Our Lady, an order of nuns founded in Portugal in 1484 by Beatrix de Sylva, sister of the first Count of Poralegro, and confirmed by Pope Innocent VIII. in 1489. At first they followed the rule of the Cistercians, but after the death of Beatrix de Sylva, Cardinal Ximenes imposed on them the rule of St Clara. The order spread into Italy and France. Their habit is a white robe with the figure of the Virgin holding the Child, and a blue mantle.

Con'cert, a name given to any musical performance except that of an opera. The first regular series of concerts seems to have been instituted by 'the Academy of Ancient Music,' an English society, which was formed in 1710, and existed until nearly the close of the last century.

Concerti'na, a musical instrument in which the sounds are produced by the passage of air through reeds, the wind being supplied by bellows which form part of the instrument, and can be extended and compressed by the hands while the fingers are left free to manipulate the keys. The C. has no importance musically.

Concer'to, a musical composition in symphony form, for a solo instrument with orchestral accompaniment. The solo parts in the modern C. are generally for the pianoforte or the violin.

Con'cha, a portion of the external ear. See EAR.

Conchif'era (Gr. 'shell-bearing'), a name given to the class of Lamellibranchiate mollusca. The name, however, is worthless, as other classes of mollusca possess shells. See LAMELLIBRANCHIATA.

Con'choid of Nicome'des, a curve of the fourth order, invented by that geometrician for the duplication of the cube and the trisection of the angle. It may be traced as follows: From a given point let straight lines be drawn to intersect a given straight line. From the points of intersection lay off along these lines on both sides of the given line distances of constant length *h*. The points so obtained lie on the C., which must therefore consist of two infinite branches, a superior and inferior, having the given straight line as asymptote. Taking the given point as pole and *a* as the perpendicular from it upon the given line, the polar equation is

$$(r + h) \cos \theta = a$$

which, transformed into rectangular co-ordinates, becomes

$$h^2x^2 = (a - x)^2(x^2 + y^2)$$

Conchol'ogy (Gr. 'the science of shells') is now obsolete as a separate branch of zoology, since to understand the shell-structure of any animal we must have an idea of the animal itself. The name is mainly characteristic of the *Classificatory* period of zoology, when *Taxonomy* was deemed everything in natural history, and when *Structure* had a subsidiary place. See MOLLUSCA and SHELL.

Con'clave (Lat.) is the place in which the cardinals of the Roman Catholic Church meet for the election of a new pope, or the assembly itself. The cardinals, with not more than two attendants (called conclavists) to each, or three to a prince, are *locked* (hence the name) into a large room, which is generally in the palace of the Vatican, till the election is over, having their food passed in through a small opening, and living in small cells within the room. The canon appointing these regulations was passed by the Second Council of Lyon, 1274.

Con'cord. See CONSONANCE.

Concord, a pretty town in Massachusetts, near the Concord river, 18 miles N.W. of Boston. On the 19th of April 1775, the first skirmish of the Revolution took place here, and a monument, on the banks of the river, marks the spot where two English soldiers fell. C. is famous as the residence of Ralph Waldo Emerson; and it has, at different times, been a favourite residence of American *literati*, as Hawthorne, Thoreau, Alcott, and Hoar. Pop. (1870) 2412.

Concord, the capital of the state of New Hampshire, on the right bank of the Merrimac river, 59 miles N.W. of Boston. It was formerly called Rumford, and here Benjamin Thompson, afterwards Count Rumford, resided for a while. The town extends along the river for 2 miles, and contains the state-house and some other handsome public buildings. It has a thriving business in iron, steel, carriages, leather, and woollen goods. Pop. in 1870, 12,241.

Concor'dance is an index of all the words in a book arranged alphabetically, with references to all the passages in which they occur, which may also give the different shades of meaning in which the words are used. A C. was first felt to be useful or necessary for the Scriptures, which were continually made the subject of appeal in learning, teaching, and disputation on religious matters. The first attempts at a C. were made by Antony of Padua (1195–1231), and Hugo de St Chers (died 1262), both being from the Vulgate. The first Hebrew C. was written by R. Nathan (1448); the best is that of Fürst (1840), based on Buxtorf's (1632). The first Greek C. to the New Testament was written by Birck, a Lutheran clergyman (1500–54). The first C. to the English New Testament was made by Thomas Gybson (before 1540), and to the entire Bible by John Marbeck (1550). All were superseded by Cruden's, 1737, which is yet the best.

The best *secular* C. in the English tongue is Mrs Cowden Clarke's *C. to Shakespeare* (Lond. 1845).

Concor'dat is a treaty regarding ecclesiastical affairs between the Pope, as representing the Catholic undivided Church, and a particular temporal sovereign. The matters treated of from time to time have been such as the right to nominate, and the right to confirm, bishops; the right to nominate to benefices while a bishopric is vacant; the right to the income of vacant benefices; and the particular taxes of *annates*, tenths, &c.; appeals to Rome; the authority of councils and of national customs against the Pope individually. The rights or claims of the national Catholic Churches used to be expressed in pragmatic rescripts, as in the French Pragmatic of St Louis (1258); and these national claims were generally modified by concordats, as in that between Leo X. and Francis I. in 1516, the effect of which, however, was postponed by the Ampliative Dispositions. Questions of the treatment of heretics, of the Papal power of excommunication, of the reception of Papal nuncios, and of the *Pase, Placito, Exequatur*, Letters of *Pasatis*, or *Placitum Regium* (the authority given by a sovereign to the publication in his territory of Papal bulls or briefs), also occurred in concordats. In 1682 the French clergy, founding on the Decrees of Constance, issued their celebrated declaration as to the *Régale*, which was acted on through the 18th c. In 1801 a C. was arranged between the Consul Napoleon and Pius VII., the nomination of bishops being by the first, the institution by the latter. Under the Revolution the institution of the constitutional

bishops had been by the Metropolitan. The organic articles of the same year carefully provided for an examination of bulls coming into France. The earliest German C. is the Calixtinum between Emperor Heinrich V. and Calixtus II. in 1122. The writings of Van Espen and the vigour of Joseph II. greatly weakened the power of the Papal nuncios in Germany in the 18th c. The German C. of 18th August 1855 was, of course, destroyed when the N. German Confederation came into existence in 1867. In Spain a C. in 1753 vested all 'patronatos' in the home authorities, the Pope reserving fifty-two benefices, and receiving twenty-two millions *reales* as compensation for *annates* and fees on briefs. The concordats of 16th March 1851, and 25th August 1859, are more favourable to Rome. In fact, Spain has always been at arm's length with the Pope on the Ultramontane question. Philip II. instituted a council, 'Concejo de la Camara,' to protect the constitution of the national Church, and Philip V. appointed a general agent at Rome, through whose *Visto Bueno* communication with the Vatican on certain matters must be made. In 1760 Benedict XIV. finally admitted the right of presentation to exist in Portugal. Carvalho strongly resisted Papal encroachment in the beginning of the 19th c. There is a Portuguese C. of 21st February 1857. The Sardinian and Neapolitan concordats have now lost their interest. The Papal Encyclical, named *Quanta Cura*, published with a syllabus, 8th December 1864, and the bull or costituzione, named *Pastor Æternus*, published 18th July 1870, indicate what sort of C. the Papal power desires to make at the present day. Under the Italian Statute of Guarantees, the Pope is merely a spiritual power. The Austrian C. was practically abolished in 1874.

Con'course, a term of Scotch law.—*Concourse of Actions* means the privilege, not usually allowed, of bringing more than one action on the same ground of right.—*Concourse of the Lord Advocate* means the necessary concurrence of the Lord Advocate in a criminal prosecution, at the instance of a private individual.

Concrete (Lat. *concretum*, 'grown together') is a term in philosophy used to denote the opposite of Abstract (see ABSTRACTION). It means that an object is considered not merely in reference to its pure essence, but as we find it in actual existence, invested with accidental qualities and attributes from which it can be dissociated in thought by an exercise of the reason. There are degrees of concretion as well as of abstraction. Take 'man' as an example of an abstract notion. The idea expressed by the word is stripped bare of everything but the mere attribute of humanity. We begin the process of concretion when we advance to the conception of an 'Aryan,' still further when we reach a 'European,' an 'Englishman,' a 'Londoner,' &c.; but the proper C. is none of these; it is the particular individual of whom we think, and in whom the various properties or peculiarities cohere.

Con'crete, a mixture of mortar with coarse materials, such as gravel, flint, peebles, &c. At one time the French term Beton was used where the matrix was *hydraulic* mortar, and C. in other cases, but the latter word has now the more general meaning. The base of the mortar used is in the best C. a hydraulic cement. For inferior C. lime is sometimes used, in which case 'poor' limes are better than 'rich.' The mortar should be made first, and the additional sand, &c., added afterwards, although in England sometimes the whole of the sand required to make both the mortar and the C. is frequently added at once. In the best C. Portland Cement (q. v.) is generally used, in the proportion of 1 part of cement to from 5 to 10 parts of aggregates in ordinary cases. C. is chiefly used for the foundations of buildings and masonry structures in general, and of late years it has found more and more extended application, both in foundations and superstructures in harbours, breakwaters, and other marine works. For these purposes huge blocks of C., weighing in some cases hundreds of tons, have been constructed in suitable moulds on shore, and when hardened conveyed to their destination by floating or travelling cranes. In this way the labour of erection and building below the waterline is very greatly reduced, while the greatest possible stability is attained.

Concre'tion, in medicine, is the formation of a solid substance either in some tissue or in the stomach or bowels. In certain diseases salt of lime is deposited as a solid mass in the lung or the tissue, but the name is generally applied to a solid substance found in the stomach or bowels, formed either by the undigested food matting together so as to cause an obstruction, or by some indigestible substance having been swallowed. Concretions are much more common in ruminating animals than in man. In the latter they sometimes consist of hair, cotton, or other substances. They are often formed in concentric rings arranged round a nucleus, *e.g.*, a gall-stone. Concretions are apt to be originated by the use of certain medicines, as magnesia. When they become very large they require prompt measures on the part of the medical practitioner. See CALCULUS.

Concu'binage. This connection was to some extent recognised by the Roman law; the offspring being acknowledged by the father, though they had not the civil rights of legitimate children. Under Augustus, C. was only sanctioned between a man and a woman of greatly inferior social position to himself. While the law of the Christian Church sanctions no sexual relationship except by marriage, the civil law of various Christian countries has been and continues to be much more lax, more especially in its application to the marriages of royal families. The law of England reduces to C. every marriage in the royal family of Great Britain which has not been previously approved of by the sovereign, if the prince or princess contracting it is under twenty-five years of age. And if the prince be above twenty-five years of age, the marriage does not hold good if disapproved of by Parliament. See MORGANATIC MARRIAGE.

Concurr'ent Jurisdic'tion. Where jurisdiction may be exercised in the same cause by two courts, or more, they are said to have C. J. The rule, then, is that the court which first exercises its jurisdiction excludes that of the others. In civil cases, the plaintiff may cite a defendant to appear before any competent court or judge.

Concus'sion (Lat. *concussio*, 'a shaking') is a term in medicine used to denote an injury to the nervous system brought on suddenly by external violence. Sometimes there is no lesion of the nervous substance or of any other structure; at other times there is laceration of the brain or other serious injury. C. is followed by insensibility and loss of all voluntary motion; the patient lies quite helpless; the pupils are unaffected by light; the pulse is feeble, and the breathing slow and scarcely perceptible. There are degrees of C. from the slightest interference with the functions of the nervous system, to that severe case in which the patient dies instantaneously. In the former cases he soon recovers consciousness, but for some time afterwards he suffers from confusion of ideas, often accompanied with noises in the ears. Frequently there is vomiting. The proper treatment consists in keeping the patient perfectly quiet in bed, and in attending carefully to the wants of nature. When there is paralysis of the bladder, the urine must be drawn off by the Catheter (q. v.). During convalescence it is sometimes necessary to modify the reaction by purgatives and by the application of cold lotions to the head; at other times it is necessary to give brandy and other stimulants, and to apply heat to the body. In all cases the patient must be watched with great care for some days.

Concussion, in law. See FORCE and FEAR.

Concussion Shell. See SHELLS.

Con'dé, a name common to several French towns. Of these, the best known are—(1) **C.**, or **C. sur l'Escaut**, a town and border fortress in the department of Nord, at the confluence of the Haine and Scheldt, 7 miles N.N.E. of Valenciennes, with an arsenal and sluices for the defence of the town. It is a great entrepôt for coal. Pop. (1872) 2818.—(2) **C. sur Noireau**, a town in the department of Calvados, 25 miles S.S.W. of Caen, where the Noireau and Durance meet, with manufactures of cotton, nails, cutlery, and leather, and a trade in flax, thread, horses, cattle, &c. Pop. (1872) 6422. It came to the house of Bourbon in 1487, and gave name to a famous branch of that house.

Con'dé, a famous French family, which takes its name from the town of C. (q. v.), can be traced as far back as the close of the 12th c. In the year 1200 a certain Godfrey obtained part of the barony of C., and was thenceforth known as Godfrey de C. His great-granddaughter, Joanna de C., in 1335, married Jacques de Bourbon, Comte de la Marche. Their second son, Louis de Bourbon, Comte de Vendôme, received as his inheritance the barony of C. His great-grandson, **Louis de Bourbon**, in virtue of his relationship to the royal family, took the title of

Prince of C., and is regarded as the founder of the new house of that name. Louis was born 7th May 1530. He was a son of the Duc de Vendôme, and brother of Antoine, King of Navarre, and first distinguished himself in arms under De Brissac. He defended Metz against the forces of Charles V., assisted in the capture of Calais, and fought on the field of St Quentin. At the conspiracy of Amboise he resolved to head the Reformed party against the Guises, and was only saved from execution by the death of François II. When civil war broke out on the massacre of Vassy, C. led the Huguenot forces from the Loire to Paris, and afterwards to the battle of Dreux (1562), which brought temporary peace. On the renewal of the war at St Denis (1567) he and Coligny were still the recognised leaders. C. fell at Jarnac, 15th December 1569, after maintaining a furious but unequal contest with the Duc d'Anjou's army. Although chivalrously brave, C. had no other quality of a commander; he was of licentious life, although he professed deep attachment to the Reformed Gospel.—**Louis II. de Bourbon, Prince de C.**, known as 'the Great C.,' born 8th September 1621, was great-grandson of the preceding, and son of the feeble prince, whose wife attracted Henri IV., and the nephew of Prince Henri of C., who fought so bravely in the closing scenes of the civil war of the Huguenots. The Duc d'Enghien, as he was called, received a careful education; his mother, Charlotte de Montmorency, then holding a sort of literary court at the Hôtel de C. Marrying a niece of Richelieu, he obtained high command in the army, and just as Louis XIII. died he made his reputation by the brilliant victory of Rocroy (19th May 1643), in which the Spanish army of Fuentes and Albuquerque was completely routed, a result to which C.'s strategic skill, decision of movement, and personal bravery all contributed. He next co-operated with Turenne in the Fribourg (Baden) campaign against Mercy, and repaired the losses of the former at Marienthal by the defeat of the latter at Nordlingen (Bavaria). The capture of Courtray and Dunkirk marked his first campaign in the Netherlands, to which, after an unsuccessful attack on Lerida, in Catalonia, he returned in 1648, and by his crushing defeat of the Archduke Leopold at Lens brought about the Peace of Westphalia. In the Fronde C. supported Mazarin and the queen-mother against the Frondeurs, but falling himself into disgrace, he afterwards attempted to organise a still greater rebellion, in which he was assisted by Nemours, Lorraine, and Le Rochefoucauld, &c., and opposed by his companion Turenne, who was successful at Gien, but defeated at the Faubourg St Antoine. C. was in 1652 declared a traitor; he entered the service of Philip IV. of Spain, and for six years conducted a brilliant war in French Flanders against Turenne, whose victory of Dunes (1658) was followed by the Peace of the Pyrenees, C. being received back into the favour of Louis XIV. The enmity of Louvois and Turenne gave C. the chief command of the French army in Franche Comté (1668) and Holland (1672–74), where he measured his skill without disgrace against that of the Prince of Orange in the bloody field of Senef. His old age was spent at Chantilly, where La Bruyère lived with him, and Boileau and the other literary stars of the period were frequently seen. He died 11th December 1686. Bossuet, who latterly had great influence over him, pronounced a magnificent funeral oration. Very different estimates of C.'s character, his political ambition, and his behaviour to his friends, have been formed. His military genius lay chiefly in daring, persistent assault, and he was therefore not sparing of human life. See Lives by Lord Mahon (Lond. 1840), Lemercier (Tours, 1844; 10th ed. 1869), and Voivreuil (Tours, 1847). There is also an interesting *Essai sur la Vie du Grand C.*, by his *quatrième descendant*, Louis-Joseph de Bourbon, *ci-devant* Prince de C. (1798; 2d ed. Par. 1806). The most recent authority on C. and the Fronde is Fitzpatrick (1874).—**Louis-Joseph de Bourbon, Prince de C.**, born at Chantilly, 9th August 1736, was the son of the Duc de Bourbon, minister of Louis XV. He first distinguished himself at Johannisberg (1762), and other engagements in the Seven Years' War. Army and financial reform and a splendid hospitality occupied his attention till the Revolution, when he emigrated. The corps which C. then formed served in the campaigns of Wurmser, in the Austrian service; in the English service at Ober-Kamlach and Biberach (1796); and in the Russian service at Constance (1799). It was discharged in 1801, and C. came to England, where he remained at Malmesbury till the Restoration. He died 13th May 1818. C. was the grandfather of the Duc d'Enghien, whose official murder so much injured Napoleon's reputation. He was concerned in the Pichegru conspiracy. See *Vie du Prince de C.* (3 vols. Par. 1819–20), by Chambelland, and Muret's *Histoire de l'Armée de C.* (Par. 1844). For the entire family, see Sévelinges' *Mémoires de la Maison de C.* (Par. 1820).

Conden'ser, an apparatus for cooling vapours down to the temperature at which they become liquid. There are various kinds of condensers in constant use, differing considerably in detail; but all work upon the same principle—namely, that of passing the vapour through a tube surrounded by material at the temperature required for the condensation. (See DISTILLATION.) The name C. is also applied to an electrical apparatus, by means of which a charge of low tension distributed over a conductor is concentrated, so that its otherwise insignificant effects are rendered visible to the experimenter. Its action depends upon the theory of electric induction, and may be simply conceived of as follows. Suppose two equal flat discs, A and B, formed of a good conducting material, to be placed close to each other, with only a thin layer of some non-conductor between. Let A be put in connection with the source of electricity, B with the ground. The charge on A induces an opposite charge on B, which reacts upon the charge on A, thus, as it were, disguising a portion of it. Now, the whole charge on B is disguised, but only a portion of the charge on A; that quantity being free with which A would be charged if the C. B were not present. The more nearly equal the induced charge is to the inducing charge, the more effective the C.; and the ratio between the charges is dependent to a great extent upon the specific inductive capacity of the non-conducting separating layer. See DIELECTRIC, ELECTRICITY.

Condensing Steam-Engine. See STEAM-ENGINE.

Condescen'dence is the name given in Scotch law to a judicial pleading. The Summons (q. v.) sets forth the name and designation of the pursuer (plaintiff) and defender, and the conclusions of the action. The statement of the grounds of action are set forth in the C., with a note of pleas in law subjoined. The C. is annexed to the summons, and forms part of it. The Defences (q. v.) must be in the form of answers to the C., with statement of the defender's allegations of fact, if necessary, and a note of his pleas in law. The summons is signed by a Writer to the Signet (q. v.), and the defences by counsel. If the pursuer do not choose to close the Record (q. v.) upon summons and defences, he revises his C., and the defender revises his defences. The record is then adjusted before the Lord Ordinary (see ORDINARY, LORD) in Chambers, and closed.

Condescendence and Claim. See MULTIPLEPOINDING.

Condic'tio Indibiti is a term of Roman law for the reclaiming of money paid under an erroneous belief of its being due. It has been decided by the House of Lords (Wilson *v.* Sinclair, 7th December 1830), that when a person pays money under an error, he has no right to recover unless the error be as to fact. Error as to law is not a valid ground for recovery.

Condill'ac, Étienne Bonnot, Abbé de, a French philosopher, was born at Grenoble in 1715. In the course of a studious life he published *Essai sur l'Origine des Connaissances Humaines* (1746), *Traité des Systèmes* (1749), the *Traité des Sensations* (1754), which was followed by the *Traité des Animaux* (1775), and the *Logique* (1780). His friend, Mademoiselle Ferrand, suggested many of his ideas. He also wrote works on *Grammaire*, *L'Art d'Écrire*, *L'Histoire Ancienne et Moderne*, &c. C. died 3d August 1780. At first a disciple of Locke, describing with special care the function of language in the formation of complex ideas, and in the development of mental faculty, C. afterwards maintained that innate faculties were as much a mistake as the 'innate ideas' which he ridiculed in Descartes, Malebranche, and Leibnitz, and that all knowledge and all mental faculties were derived from sensibility, being in fact only 'sensations which transform themselves differently.' Thus memory, attention, judgment, &c., were merely sensations persisting in a certain way. Similarly all the emotions were transformed desires, and desire was simply the withdrawal of sensation. It followed that the lower animals have not such vivid sensations as man (an exceedingly doubtful matter). C.'s philosophy, partly adopted from Gassendi and Hobbes, and en-

thusiastically applied by Diderot, De Tracy, and the other *idéologues*, consisted (1) in nominalism, (2) in the confusion of sensation with ideation. His analysis of the faculties, proceeding on this confusion, becomes merely verbal, his language constantly assuming the separate laws of mental growth which his theory denies. While, however, he conceived of the operation of (*e.g.*) memory as a mere mechanical tendency to motion, growing up through repeated motions, he also conceived the soul as a perfectly distinct entity, of whose life nervous motions were only the occasional cause. His theory led him to attach exaggerated importance to language, of both artificial and natural signs, which, if properly arranged, he regarded as being an accurate register of human experience. Reasoning was, therefore, speaking properly. C. is remarkable for the clearness and simplicity of his style, and is perhaps best seen in his criticism of the abstract systems, such as the Leibnitzian monads, the ideas of Descartes, &c. C.'s *Œuvres* were collected and published from autograph MSS. in 23 vols. (Par. 1798), and another edition followed in 32 vols. (1803).

Con'diments are agents used at table to aid the alimentary functions, and to give relish to such articles of food as are difficult of digestion, as fish, veal, vegetables, &c. The simpler C. are salt, butter, sugar, pepper, mustard, vinegar, and pickles. In hot countries, where the digestion is more liable to languish, stronger C. (*e.g.*, betel and curry) are in extensive use.

Condi'tion. In logic, conditions are the antecedents which combine to produce a certain effect, the antecedent which directly brings about the effect being termed the cause. Thus, a spark of fire might be termed the cause of an explosion, though, in reality, it is only the apparent occasion, and the nature of powder a C. necessary to produce the effect. 'The real cause,' says Mill, 'is the whole of the antecedents. Though we may give the name of cause to that one C. which brings about the effect without further delay, this C. has no closer relation to the effect than any of the other conditions has.' See Mill's *Logic*, book iii. chap. v.

Condition. In the real property law of England, it was at one time held that the gift of an estate by the lord to a vassal and the heirs of his body was a gift on C. of his having heirs of his body, and that if he died without having had heirs of his body the estate must revert to the lord. The C., however, was so far fulfilled by the vassal having heirs of his body, that, even though they predeceased him, he might alienate the land. An estate so bestowed may now, by certain legal procedure, be made an absolute gift.

Conditio si sine liberis decesserit.—By Roman law, a gift of estate made when the donor had no children became void on his having children. The principle of this law is recognised in Scotch law in testamentary settlements and in donations *mortis causa.*

Condi'tional Obliga'tion. An obligation depending on a condition has no force until the condition exist, but the granter cannot revoke the ground of hope which he has given. Contracts are null if illegal or impossible conditions are annexed. But such conditions, or frivolous conditions, annexed to a legacy, are merely held *pro non scriptis*, and non-compliance does not affect the right of the legatee.

Conditional Legacy. See CONDITIONAL OBLIGATION, LEGACY.

Conditional Institute, a Scotch legal term. Under destinations of real property, the immediate disponee of the granter is called the *institute.* Those to whom the property is destined, failing the institute, are called *substitutes.* When the destination to the immediate disponee is conditional, he is called a C. I. See DISPONEE-SUBSTITUTE.

Condi'tioned. The philosophy of the C. is the name given by Sir W. Hamilton to a particular application by him of the doctrine of the relativity of human knowledge. 'There is no ground,' he says, 'for inferring a certain fact to be impossible, merely from our inability to conceive its possibility.' This arises, not merely from the limitations of human experience, which, by creating certain powerful associations, exclude others, but because the human mind may be naturally incapable of conceiving many things. Besides the two ordinary meanings of inconceivability, however, viz., impossibility of representing the thing as an image, and impossibility of realising the thing as possible, Hamilton adopted a third, viz., impossibility of explaining, proving, or comprehending under a more general notion. He then states his theory: 'The C. is the mean between the two extremes—two unconditionates, exclusive of each other, neither of which can be conceived as possible, but of which, on the principles of contradiction and excluded middle, one must be admitted as necessary.' This he applies to the antinomies of space, time, free will, &c., maintaining that limited and unlimited space are alike inconceivable, but yet one is necessary. It has been objected to this theory, that it employs the word *inconceivable* in several senses; that the logical dilemma applies not to absolute existence, but to the world of known things, and that no meaning is discovered in the phrase, 'mean between two extremes' when applied to propositions in which different predicates are affirmed of different subjects. A warmer interest has been imparted to the discussion of this theory since its application by Dean Mansel, in his celebrated *Bampton Lectures on the Limits of Religious Thought*, to the question whether a knowledge of the Absolute and Infinite Being is possible to man. The object of the Bampton Lectures was the important one of displacing all *à priori* criticism of the doctrines of revelation, as these doctrines deal with subjects inaccessible to the moral sense and intellect of man. The scholastic discussion of these abstract notions was therefore taken up by the school of theology who believe that revelation is best defended by showing its adaptation to the wants and aspirations of the human heart. As was inevitable in such a discussion, the term 'Absolute' was used in a great variety of meanings, such as the Perfect, that which is free from relation, that which is self-existent or free from external conditions. The controversy, so far as philosophical, has been admirably summed up in Bolton's *Inquisitio Philosophica.* In illustration of the trifling nature of some portions of the argument, it may be noticed that from the acknowledged principle (which Sir W. Hamilton had successfully established against Cousin's theory of an intuited Infinite) that all consciousness is based upon change and the comparison of relations, it was argued that the Absolute could not even be conscious of itself, since any relation conflicts with the notion of the Absolute, relatives being mutually dependent on each other. In this way it became easy to demonstrate that a Being, defined as transcending human consciousness, was not the subject of human knowledge apart from revelation. It was less easy to explain the manner in which the conditions of human consciousness were set aside by revelation.

Condona'tion in the law of England and of Scotland means *forgiveness.* A plaintiff may condone an offence either by an act implying forgiveness, or by complicity with the wrong-doing of the defendant. C., as accessory or accomplice, bars the suit of the plaintiff. The word is chiefly used in actions of divorce on the ground of adultery.

Con'dor (*Sarcorhamphus gryphus*), an American species of Vulture (q. v.), inhabiting elevated parts of the Andes, and of large size, the average length being between 4 and 5 feet, and the expanse of wings being about 14 feet. The tail is wedge-shaped. The plumage is black; the males have white wings, and their heads are combed and provided with wattles. The beak is curved at its tip. The food consists of carrion, and these birds consume large quantities of food. The King Vulture (*S. papa*), another species of this genus, inhabits Brazil and Guiana. Its plumage is red above and white beneath, with black tail and wings. The Californian vulture (*S. Californianus*) is a third species of the genus to which the C. belongs.



Condor.

Condor'cet, Jean Antoine Nicolas de Caritat, Marquis de, a French philosopher, born at Ribemont, Picardy, 17th September 1743, of a noble family, was educated by the Jesuits of Rheims, and at the College of Navarre, Paris. His

talent was chiefly mathematical, and his *Mémoires* on the integral calculus, probabilities, and the higher analysis generally, won the admiration of D'Alembert and Lagrange, the former of whom secured, in 1773, C.'s election as secretary to the *Académie des Sciences*, though Buffon's friend Bailly was a candidate. In this position he wrote many of the finest *éloges* in French literature, notably those of Buffon, D'Alembert, Franklin, Lafontaine, &c. He pled warmly against religious distinctions in scientific societies, asking whether a society containing the Atheist Aristotle, the Catholic Descartes, the Unitarian Newton, the Calvinist Huyghens, the Deist Leibnitz, the Jansenist Pascal, the Mahometan Al Hazen, &c., &c., would not be the best of its kind. Drawn by his friendship for Voltaire and Turgot into social discussions, C. wrote against Necker for free trade in corn and against the feudal taxations. From 1776 to 1791 he held a position resembling the Mastership of the Mint. The lives of Turgot and Voltaire, the slavery abolition question, and religious equality, occupied his attention as well as his official duties. His activity in writing on political questions immediately before and during the first years of the Revolution was great. As member of the Legislative Assembly of 1791 and the Convention of 1792, he prepared reports on the question of peace or war, was influential in taking the custody of registration from the clergy, strongly opposed the capital sentence of the King, and was consulted on all constitutional points of importance. On the expulsion of the Girondins, however, he was denounced by the Committee of Public Safety, and compelled to hide for six months in the house of Mme. Vernet, where he composed his famous *Esquisse des Progrès de l'Esprit Humain*, afterwards printed by order of the Convention. Leaving this shelter, which exposed his friend to the penalty of death, C. escaped from Paris, but was retaken, and died by poison, self-administered, at Bourg la Reine, 28th March 1794. C. had a noble wife, who strengthened him greatly in his separation from the aristocratic party to which he by birth belonged, and in his persecution by the Terrorists, whose constitution of '93 he had opposed. She was the sister of Marshal Grouchy and the sister-in-law of Cabanis. She translated Adam Smith's *Theory of Moral Sentiments* into French. During her husband's concealment she supported herself by painting portraits, the Government having sequestered C.'s property. C. himself was a man of delicate sensibility and warm affections, and undoubtedly one of the greatest intellectual figures in the Revolution. His theory of human progress has been blamed as establishing a rather inconsistent division of history into periods; one being political, another scientific, another religious. His conclusions that equality, or *equal freedom* of nations and classes (as regards trade, wealth, education, government, &c.), will be established, and that human nature is indefinitely perfectible morally, physically, and intellectually, have excited much mistaken ridicule. C. in fact announced the truth that the mental acquisitions of one generation are not dissipated, but transmitted to its successor; he insisted that this might take place with regard to morality as well as intellect; he did *not* suppose that medical science would ever make man immortal. Complete collections of his numerous writings have been made by Garat and Cabanis (22 vols. Par. 1804), and by Condorcet-O'Connor and Arago (12 vols. Par. 1847–49).

Condottie'ri, soldiers of fortune of the 14th c., whose services in warfare were sold to the side that promised most plunder. The quarrels of the petty Italian states gave these mercenaries constant occupation. Among their celebrated chiefs were Francis of Carmagnola, and Sforza, who became Duke of Milan.

Conductiv'ity, thermal or electric, of a given substance, is the amount of heat or electricity which flows through a cube of unit volume in unit time, the difference of the temperature or potentials of the opposite sides being unity. The late Principal Forbes has shown that the thermal C. of pure metals is probably inversely proportional to the temperature from absolute zero, and the same law seems to hold in the case of electric conduction. This law is deducible from theory, upon the hypothesis that heat, during its conduction, arranges itself exactly as it would do if let down from the hotter to the colder part by a perfect engine, *i.e.*, so disposes itself that the least possible amount of work can be got from it during the operation. (See THERMODYNAMICS.) Non-metallic substances are in general bad conductors of heat, and frequently non-conductors of electricity; and these increase in conducting power as their temperatures rise. Liquids are of small conducting power as compared to solids, and the experimental determination of their C. is a matter of considerable difficulty, in the one case owing to the disturbing effects of the thermal convection currents produced, and in the other, if the liquid be a chemical salt or compound, to the electrolytic action and polarisation which generally supervene. The C. of gases is still more difficult of determination, radiation and convection playing by far the most important part. See ELECTRICITY, HEAT.

Conduc'tor, in music, the director of a performance. The C. generally stands in front of the performers, and marks the time for them with a baton, while at the same time he indicates the expression and the entrances of the different parts or instruments. The C. of an orchestra must be distinguished from the *leader*, who is the principal first violin.

Condylu'ra. See STAR-NOSED MOLE.

Condy's Fluid. See MANGANESE.

Cone. See FRUIT.

Cone, the solid formed by drawing lines from every point of a closed plane curve to a given point not in the plane of the curve. If the C. be cut by a plane parallel to the base, the curve of section is similar to the base, and the solid bounded by these parallel planes is called the *frustrum*. The most important C., however, is the *right C.*, which may be generated by the rotation of a right-angled triangle about one of its sides. If it be intersected by a plane perpendicular to the axis of rotation, the curve of intersection is a *circle*; if by a plane inclined at any angle, but cutting both sides of the C., an *ellipse*; if by a plane making with any side an angle equal to the vertical angle of the C., a *parabola*; and if by a plane making any inclination less than this, a *hyperbola*. For the special properties of these conic sections, reference must be made to the several articles.

Coneglia'no, a town of N. Italy, province of Treviso, 28 miles N. of Venice by railway, with several churches, an hospital, and manufactures of silks and woollens. Pop. 6500.

Cone-Shell, a genus of Gasteropodous mollusca, belonging to the family *Conidæ*, in which the shell is inversely conical; the aperture long and narrow, and the outer lip notched near the suture. The *operculum* is minute and of lamellar structure. This family belongs to the *Siphonostomatous* (or 'siphon-mouthed') division of Gasteropoda, and to the order *Prosobranchiata*, in which the gills are placed anteriorly to the heart. These molluscs are common in the Mediterranean and in tropical seas. *Conus imperialis*, *C. admiralis*, *C. nobilis*, *C. textilis*, *C. tessellatus*, &c., are familiar species.

Confarrea'tion, a Roman form of marriage ceremony, deriving its name from the *panis farreus* (bread made of spelt) used on the occasion. The children of parents so married were alone eligible for certain offices of the priesthood.

Confec'tionery. Under this name are included the various manufactures of sugar for use as sweets, or *bonbons*, as they are called by the French. The simplest form in which sugar is prepared for eating is when it is crystallised from a solution into candied sugar. It is generally prepared from raw sugar, and has a brown colour; but when tinted, refined sugar is employed, and the colouring material added to the solution. The crystallisation takes place around thin slips of wood or pieces of twine, which are always found in the core of the material. Sugared almonds, cloves, caraways, corianders, &c., and sweets having a core either of fruit or baked sugar, as in the case of 'pan drops,' all of which are included in the French *arages*, are thus prepared. The cores of fruit or sugar are placed in a large copper pan, revolving at an angle of about 45°, heated by steam admitted to circulate between its outer and inner surface. The revolution of the pan at this angle causes the materials within it to be in constant motion tumbling over each other. A gentle stream of sugar solution is allowed to trickle continually into the pan, and the continual motion of the materials secures a proportion to each separate piece, and at the same time keeps them from adhering to each other, while the heat dries off the superfluous moisture. Thus the cores become gradually and uniformly encrusted in pure sugar, and the longer the process continues, the thicker becomes the coating. Ordinary lozenges (*trochisi* of druggists) are prepared from loaf-sugar broken, and

ground to a fine powder. This is baked up into a stiff cake with a pure solution of gum arabic, rolled out to the required thickness, and the lozenges cut out by hand or machine. They are then put aside to harden and dry in trays. The paste may be tinted with any colouring material, and flavourings such as peppermint, ginger, clove, rose, musk, &c., are introduced in the baking. Medicated lozenges are an elegant and pleasant form of administering minor remedies for coughs, children's ailments, &c., when suitable ingredients are introduced into the paste; but the use of lozenges containing morphia, codeia, and other narcotic substances should be carefully guarded. Pastilles are preparations containing a large proportion of gum, in which the sugar is wholly dissolved, and they are usually tinted and flavoured with fruit essences. Preparations of boiled sugar form a distinct class by themselves, and occur in a variety of forms, such as 'drops,' barley-sugar, rock, balls, &c., variously tinted and flavoured. The sugar is dissolved by heat over a fire, care being taken to keep it from burning, and when poured out in thin layers, it is worked up into its various forms, after it has acquired such a plasticity as enables it to be handled. Toffee or butter-scotch is made by boiling up sugar, honey, and butter together, but frequently the honey is altogether omitted from the preparation. The French excel in the preparation of various sweets, and their *fondants* have often an exquisite flavour, and are manufactured in a very attractive manner.

Confedera'tion of the Rhine, a confederacy formed by Napoleon when he destroyed the Holy Roman Empire in 1806. It consisted of sixteen German princes, who disowned connection with the ancient empire, allied themselves with France, and acknowledged Napoleon as protector of the league. It undertook to furnish him, in war, with 63,000 soldiers. This unpatriotic alliance was dissolved in 1813, on the fall of Napoleon, and the Germanic Confederation was constituted in its place in 1815.

Con'ference, in English law, means the professional interview of an attorney or solicitor and counsel. When barristers meet professionally for friendly deliberation, the meeting is called a *consultation*.

Conference, Wesleyan. See WESLEYAN CONFERENCE.

Confer'va, the type of the division of green-spored Algæ (q. v.), called *Confervaceæ*. They are exceedingly delicate, thread-like, articulated, cellular plants, found mantling the surface of stagnant pools, and constituting much of the 'scum' of such collections of water. When dry, the masses of confervæ look like cotton, and, indeed, have been used as a packing instead of tow, to support fractured limbs It has been proposed to apply these cotton-like masses to economic purposes, but the project has not yet taken any tangible shape.

Confes'sion, in the ecclesiastical sense, means the acknowledgment of sin, accompanied with submission to penitential discipline, and the reception of an authorised sentence of reconciliation. All Christians admit that they are to confess their sins to God. The sacrifices or 'sin-offerings' which, from the first, were offered to Jehovah for pardon of sin, always implied C. of that sin, whether openly expressed or not. According to the Jews, repentance could not be complete without C., of which their Rabbis enumerated three kinds. The ministry of John the Baptist was based on the same principle. In the early Christian Church, C. was practised, along with other exercises, as a preparation for baptism; and this C. was sometimes public and sometimes private. In the case of public, scandalous offences, transgressors were obliged particularly to promise to forsake them; but no public or particular C. of private offences was required of men at baptism, beyond what was implied in the general renunciation of Satan and all his works. Those who were guilty of public, notorious, and scandalous crimes after baptism had to undergo public Penance (q. v.) before being again admitted to the communion. As to private offences, sometimes public C. and penance were made for them, and sometimes a public minister was appointed to hear men's C. and direct their repentance; but this was by no means an essential condition for communion, much less was auricular C. and private absolution from a priest; it was all a matter of advice and free choice. But in the fourth Lateran Council (1215) Pope Innocent III. published a decree, requiring it to be held as an article of faith that every one is bound, by a positive divine ordinance, to confess his sins to a priest, and the dogma of auricular C. was fully established in the Roman Catholic Church. In the standards of the Church of England, C. is permitted, and in some cases recommended. The practice fell into almost complete disuse, however, after the Reformation; but in modern times it has had a great revival in the High Church party. See Bingham's *Antiquities of the Christian Church*.

Confession, in law, means avowal or admission of an allegation. In England, in a criminal case, a jury may convict a prisoner on his C. without further evidence, provided it be made without intimidation or bribe. In Scotland, corroboration is required, the C. being merely held as evidence. In a civil action, refusal to deny an allegation within the knowledge of the party is held as C. of its truth. C. before an ecclesiastical court, even though followed by public Church censure, is not in Scotland held as proof in any civil or criminal matter by a lay court.

Confession and Avoi'dance is, in common-law pleading in England, the admission of an allegation of the opposite party, but with the addition of some circumstance which destroys its legal effect.

Confession, Judgment by, in England, is judgment against a defendant on his admission of the law and facts alleged against him.

Confes'sional is an enclosed seat or recess in Roman Catholic churches in which a priest sits to hear penitents make confession. The usual place used to be an open seat in the chancel; the modern C., resembling a sentry-box, with a small window for penitents to speak through, being of recent introduction.

Confessions of Faith might be called elaborated Creeds (q. v.). The principal C. of F. extant, which were composed at the time of the Reformation or soon after, are the following:—Confession of the Roman Catholic Church, contained in the decrees of the Council of Trent (q. v.); Confession of the Lutheran Church, contained in the three ancient creeds, the Augsburg Confession (q. v.), and Melancthon's Apology, the Articles of Schmalkald, Luther's Catechisms, the Concordienformel, and the Articles of Visitation (1592); Confession of the Reformed or Calvinistic Churches—the Helvetic, Tetrapolitan, Gallic, Palatine or Heidelberg, and Belgic; Confession of the Anglican Church—the Thirty-nine Articles (q. v.); the Confession of the English and Scotch Presbyterian Church, and the Westminster Confession of Faith and Catechisms, drawn up by the Assembly of Divines who sat at Westminster from 1643 to 1649.

Con'fident Person means in law an intimate associate or dependent. The term is especially applied to a partner in business, steward, agent, or servant of any one. Deeds of an insolvent person in favour of those so connected with him, if granted without adequate consideration, are in Scotland reducible by statute. See CONJUNCT PERSONS, COLLUSION, CONSIDERATION.

Confidential'ity, in law, denotes the legal privilege which some communications have. Letters between agent and client have the privilege of C. No action of damage can be founded on them, nor can either be required to produce them in a suit or action. How far the privilege extends has been the subject of much legal discussion. It has been decided that a former agent is bound to secrecy, and in England the tendency of decisions has been towards a wide view of the privilege (see Dickson on *Evidence*). In Scotland it is still doubtful whether confessions made by a criminal to a clergyman are privileged. In England it has been decided that they are not. Physicians are not entitled to withhold communications, however confidential. In Roman Catholic countries the 'Seal of Confession' is held inviolable. Husband and wife are admissible as witnesses for and against each other in civil suits, but neither is a competent witness against the other in a criminal case. See EVIDENCE.

Confirma'tion is a rite supplementary of the sacrament of baptism, and without which no one is admitted to the sacrament of the Lord's supper. It means literally a *strengthening*, and is so called because they who receive it are understood to be strengthened thereby for the fulfilment of their Christian duties. There has been a controversy between Romanists and

Protestants as to whether such a rite existed in the time of the apostles, or whether it originated at a later date. Be this as it may, it was, in the early Church, always performed in connection with baptism. The full ceremony of baptism consisted, besides the immersion, of unction, of the sign of the cross (the seal of the Lord), and of the imposition of hands accompanied with prayer; and by the name of one or other of these three actions it was generally known. Baptism thus consisted of a negative and a positive part: the cleansing from sin, signified by the immersion; and the importation of the Holy Spirit, signified by the imposition of hands. Now, as the Holy Ghost was given by the laying on of the apostles' hands (Acts viii. 14–19, and xix. 1–6), this power was reserved exclusively for their successors, the bishops. Accordingly the latter part of the rite of baptism, which afterwards came to be called C., could only be performed at the same time with the immersion (which could be performed by the presbyters, and even the deacons) if the bishop happened to be present. If not, it was performed by him at the first opportunity, for which purpose he went periodically through his diocese. It was not till the 13th c., however, that C. came to be regarded as a separate ordinance from baptism, even in the case of infants, to whom at first the eucharist also was given at the same time. The Council of Trent (1545) pronounced it to be a true and proper sacrament. In the Eastern Churches, baptism, C., and the eucharist are all administered yet in immediate succession. In the Western Churches, for the last three or four centuries, a delay of seven years has been interposed between infant baptism and C. In the Anglican Church, this delay is extended to fifteen or sixteen years. See Blunt's *Dict. of Doct. and Hist. Theology*, 1875; Smith's *Dict. of Christ. Ant.*, 1876; Bingham's *Eccl. Ant.*

Confirmation, in English law, means the conveyance of a right which one has in land to another having possession. In Scotch law, C. means the form in which a title is conferred on the executor of one deceased to administer. The process for C. goes on before the Commissary (q. v.) of the district.

Confirmation, Charter of, in Scotch conveyancing, is the title of a charter granted by the superior to the purchaser of a property. It is so called because it confirms the rights granted to the purchaser under the Disposition (q. v.) in his favour, and the Sasine (q. v.) following upon it.

Confisca'tion is a forfeiture of lands or goods to the crown, being part of the punishment of certain crimes. See ATTAINDER.

Con'flict of Laws. There is no kind of question more perplexing to the mind of lawyers than that which springs from the confliction of the law of different states. An individual may have two nationalities by parentage, and many nationalities by residence and right of property in various countries; thus it may be very difficult to say under the law of which country this individual or his right of property ought to be. Even in the Roman Empire the C. of L. was very embarrassing, for the inhabitant of one province was not subject to the jurisdiction of the magistrate of another. But it has been since the Roman Empire dissolved into the various kingdoms of modern Europe that the full force of the difficulty has been felt. In the United States of America it has been also very greatly felt, owing to the partially independent character of the states forming the Union. In Great Britain, the chief conflict of law has arisen from the difference in the legal doctrine of England and Scotland respecting the constitution of Marriage (q. v.), and in the determination of other points involving questions of Domicile (q. v.). See also INTERNATIONAL LAW, COMITY OF NATIONS.

Confor'mable Strata, in geology, are strata deposited one above the other in parallel layers. They indicate the absence of any great physical disturbance (save perhaps an interrupted but gradual rise or fall of the whole district) during their deposition, and point to a comparatively short geological time between the formation of any two. See UNCONFORMABLE STRATA.

Confron'té, or **Com'battant**, in heraldry, two lions or other beasts of prey, face to face, rampant.

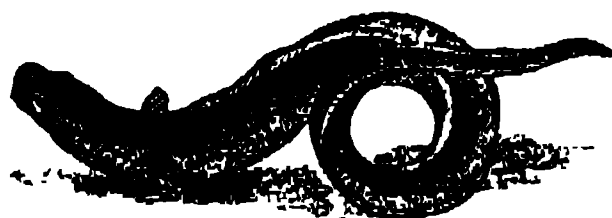
Confu'cius (a Latinised form of *K'ung Fu-tsze*, 'the Master Kung'), the son of Shu-leang Hŏh, a brave soldier of ducal descent, and Chingtsae Hen, was born in the district of Tsow, now Yenchow, 21st of 10th month, B.C. 551. His father's death left him poor. After a studious youth, he married at the age of nineteen, and then became keeper of grain stores, and afterwards of the public lands and fields. At the age of twenty-two he began publicly teaching for fees the 'doctrines of antiquity.' In B.C. 528 he lost his mother. After a long study of the history, literature, and institutions of the empire, C. obtained from Prince Ch'aou, through a favourite pupil, Hohe, the means of travelling from his native state of Lu to the state of Chow, where he met Laou Tau, the founder of the Rationalistic sect named Taouists. Civil commotion in Lu next forced C. to retire to the state of Tse, where he enjoyed the friendship of the King, and extended his knowledge of music. From B.C. 515 to 501, he remained in Lu without public office, but with an increasing number of disciples. After the expulsion of the usurper, Yang Hu, C.'s success as chief magistrate of the town of Chung-tu led to his appointment by the Prince Ting (of Lu) as Assistant-Superintendent of Works (in which capacity he carried out a survey, and many agricultural improvements), and latterly as Minister of Crime. His determined opposition to the great private families, and his administrative power, made him many enemies in Lu and Tse; in B.C. 496, he was driven from the court, and spent the next thirteen years in wandering from state to state, chiefly in Wei, Ch'in, and Ts'u. In 483 he returned to Lu, where he spent the last five years of his life; consulted occasionally on public affairs, but chiefly engaged in revising his works on rites and history, and in the reformation of music. After losing his son Le, and his disciples Yeu Hwuy and Zsze-lu by death, C. himself died, on the 11th of the 4th month B.C. 478. His disappointments in life were compensated by the universal veneration of his memory. His classics have become the text-books of instruction in all schools and colleges, and the subject of competitive examination for civil posts. He not only receives titles of honour, as the Ancient Teacher, the Perfect Sage, &c., but in association with his ancestors and four eminent disciples, he is regularly worshipped in temples built for the purpose, the Emperor performing an act of public worship twice in the year. The immense literary class of the empire transmit the influence of C., which extends to the Taouist and Buddhist population, as well as to the pure Confucians. The Chinese classics consist of the Five *King* (or canonical works), which are the Yih (Book of Changes); the Shu (Book of History); the Shi (Book of Poetry); the Le Ke (Book of Rites); the Ch'un Ts'ew (Spring and Autumn), a chronicle of events from 721 to 480 B.C.; and the Four *Shu* (or writings), which are the Lun Yu (or the Confucian Analects or Digested Conversations of C.); the Ta Hëo (Great Learning), attributed to Tsang Sin; the Chun Yung (Doctrine of the Mean), ascribed to K'ung Keih, the grandson of C., and the works of Mencius. These works (which have been the subject of innumerable commentaries) were first completely collected by the Emperors of the first and second Han dynasty. Since the beginning of the Christian era they have been jealously preserved by the state, but it should be remembered that the original text was put together from scattered bamboo tablets, which the T'sin dynasty (B.C. 220–200) had endeavoured to destroy. The Ch'un Ts'ew is the only work entirely composed by C. The great feature in the philosophy of C., is that he professes to base everything on the past; to revive the wisdom of elder sages, and the purer and more scrupulous rites and ceremonies of former times. Possessed of high and noble conceptions of morality, and of a warm and generous disposition, he nevertheless, in accordance with the genius of his race, put a faith in the minute external regulations of life which is pedantic and incomprehensible to Europeans. This faith has communicated itself to the empire, and has survived through many political revolutions to the present day. It is probable that C., while insisting on the duty of ancestor-worship (a form of human service revived by Comte), had little belief in the objective existence of the Shang-Te, or Supreme Spirit, mentioned in the Book of History, or of departed relatives and friends. 'To give one's-self earnestly,' said he, 'to the duties due to men, and, while respecting spiritual beings, to keep aloof from them, may be called true wisdom.' Both his political and social systems assume a perfect rigidity of political and social relations. The authority of rulers over their subjects, of husbands over their families, &c., although theoretically qualified by the condition that those in authority must be virtuous and benevolent, was with him an ultimate fact; this view, however false when applied to progressive nations, is apparently justified by Chinese history. 'The grass must bend,' he

says, 'when the wind blows across it.' In the same way women have always been oppressed in China; 'talkativeness' being one of the seven grounds of divorce laid down by C. The despotic principles thus applied to the five relations of society (including those of friendship and of elder and younger brother), must have been useful in establishing the centralisation of the imperial power, and the suppression of feudalism. C.'s negative expression of the Golden Rule of Christ has often been commented on; his ethical code, however, permits blood-revenge, a thing repugnant to Christian ethics. See Legge's *Chinese Classics*.

Confu'sion, a term of Scotch law, denoting the extinction or suspension of an obligation by the debt and credit devolving on the same person.

Congé-d'Élire is the sovereign's licence to the dean and chapter to *elect* a new bishop when the see is vacant. It is accompanied by letters-missive from the crown, naming the person to be elected. If the election is delayed beyond twelve days, the nomination may be effected by letters-patent from the crown. If the dean and chapter elect any other than he who is named, they incur the penalties of a *Præmunire* (q. v.).

Con'ger Eel (*C. vulgaris*), a genus of Teleostei, included in the sub-order *Malacopteri* (*apoda*), and differing from the ordinary eels (*Anguilla*), chiefly in the length of the dorsal fins, which commence above the pectoral fins. The upper jaw is larger than the under jaw. The tail is elongated and pointed. The C. E. may attain a length of from 3 to 6 feet, and a thickness equal to that of a human leg. The colour is a brownish-black above, and a white beneath. It is the only British species, and is fished chiefly on the S. coasts of Britain. The flesh is coarse, and used for food only by the poorer classes. The baits used in its capture are small fishes of various kinds.


Conger Eel.

Conges'tion, in medicine, is a term used to denote that condition in which there is excess of blood in a part of the system. It is of three kinds:—(1) *Active C.*, in which there is an increased flow of blood to a part through the arteries. This occurs in all local inflammations, and was denominated by the older surgeons *determination of blood to the part*. It may result from the application of some irritant, as is seen in the redness produced by a mustard-poultice, which is due to the increased flow of blood to that part. Active C. often ends in hæmorrhage, especially when situated in a mucous membrane, as in the stomach or bowels. (2) *Passive C.*, when the excess of blood in the parts is due to want of tone in the small blood-vessels (capillaries). These capillaries are dilated, and the circulation of the blood in the part is sluggish, and as a consequence the serum of the blood is exuded, and dropsy is the result. Passive C. is often the result of Active C. (3) The *Mechanical C.* of some authors is C. due to obstruction in some vein, as a tumour pressing on a vein. Tight garters will produce C. of the lower extremities. Pregnancy often produces the same kind of C. Mechanical C. produces a variety of passive C. In active C. the part is generally bright red; in passive C. it is more or less of a dark-purple colour. The latter kind is often seen after debilitating diseases, giving rise to dropsy of the lower extremities, which is always aggravated by the erect posture. Treatment of C. will depend on the kind of C. present. In all cases the cause is to be removed if practicable. In passive C., iron tonics internally, and astringents, as alum or zinc, externally, will often do good.

Con'gleton, a market-town and borough, Cheshire, on the Dane, 33 miles E. of Chester, with manufactures of cotton and silk. C. silk fabrics are of superior quality. Many of the houses consist of timber-framing and plaster, which gives the town a picturesque and ancient appearance. Pop. (1871) 11,344.

Conglom'erate, or **Pudding-Stone**, is a rock composed of water-worn peebles (usually quartz or other highly siliceous mineral), cemented together by a matrix of sand, clay, or lime. It indicates the position of a former coast-line, and a subsequent depression below the sea. *Breccia* differs from C. in being made up of angular fragments.

Congo, or **Livingstone**, the greatest if not the longest river of Africa, drains the region lying to the W. of the Great Central Lakes, and enters the Atlantic in lat. 6° S., 200 miles N. of Loando. It issues from the N.W. extremity of Lake Bangweolo (q. v.), and flows N. as the Luapula to Lake Moero, then in a N.W. direction as the Lualaba (Webb's River) to Lake Kamolondo; after leaving the lake it takes a great curve to the W. before reaching Nyangwe, the most westerly point attained by Livingstone (April-June 1871), and the point from which Stanley began to trace its course. The C. then flows due N., and under the equator rushes over five cataracts, round which Stanley's boats had to be dragged for 13 miles. One of the most remarkable and unexpected of Stanley's revelations was this great northerly sweep of the river, which takes it to 1° 45' N. lat. Further on it trends S.W. to the Atlantic, taking the name C. (*Kwango*) or Zaire. It has an estimated drainage area of 1,400,000 sq. miles, and a length of over 3000 miles. Stanley names many affluents, but explored none. One, the Sankuru, is obviously Cameron's Sankorri; another, 2000 yards wide at its junction (about lat. 1° N.), is called Aruwimi, and is supposed to be Schweinfurth's Welle. Stanley reports that for 780 miles (16° 50'–25°50' E. long.) the C. is continuously navigable, but for 170 miles the lower course is impeded by rapids and cataracts. The country through which it flows is densely wooded; oil-palms, white cotton, india-rubber, ground-nuts, and ivory are superabundant. The basin of the Upper C. is rich in copper and gold mines. Stanley gave the name 'Livingstone' to the whole river. See Burton's *Gorilla Land and the Cataracts of the C.* (2 vols. 1876); Monteiro's *Angola and the River C.* (2 vols. 1876), and Stanley's *Through the Dark Continent*, &c. (1878).

Congrega'tion means—(1) in its largest sense, the visible Church, or the whole body of Christian people considered as assembled in some act of fellowship; and then popularly (2) the worshippers assembled in a particular place. (3) Again it was the ancient name for a Chapter (q. v.); and (4) in the Roman Catholic Church it means a council or court of cardinals and other divines.

Congrega'tionalists, the proper name of the body of Christians, best known as Independents (q. v.).

Con'gress is the term applied to a conference of European sovereigns, or of their plenipotentiaries, to consider matters of international interest, and generally to adjust the Balance of Power (q. v.). Such were the Congresses of Vienna, held in 1815; of Carlsbad, in 1819, for adjusting the position of Germany; and of London, in 1826, for fixing the fate of Greece. At a C. there is no presentation of credentials on the part of the members, although they exchange and examine the warrants under which they act. In the U.S., C. is a collective name for the Senate and the House of Representatives, but had originally a similar meaning to what it has in Europe.

Con'greve, William, one of the greatest of our comic dramatists, was born in Stafford in February 1670, and educated at Dublin. He soon abandoned the law—for which he had studied—in favour of literature. His first comedy, *The Old Bachelor*, written at the age of twenty-three, won him the patronage of Lord Halifax, through whom he obtained a place in the Pipe Office and a post in the customs. After writing two comedies, *The Double Dealer* and *Love for Love*, he produced the *Mourning Bride*, a stilted tragedy, which met with enormous success. His last comedy, the *Way of the World*, being coldly received, he gave up writing plays, and spent the rest of his life in wealthy leisure. He died 19th January 1729. His career was eminently successful. Ministers competed to offer him sinecures; poets competed to praise his works. Dryden, Pope, Swift, Steele, and Addison were united in admiration of him. There is little humour, and, excepting in *Love for Love*, little feeling in his plays, but, although immoral, they are free from the beastliness of Wycherley, to whom C. is immeasurably superior. The *Way of the World* is a masterpiece of brilliant dialogue; there is in it a perpetual sparkle of piquant conceits, arch raillery, and sprightly repartee and innuendo. The best edition of C. is that by Leigh Hunt (Lond. 1849). See also Thackeray's *English Humourists*, and Macaulay's Essay on the *Comic Dramatists of the Restoration*.

Con'gruous. In the theory of numbers, two numbers, *a* and *b*, are said to be C. to one another with respect to a third, *c*, when $\frac{a-b}{c}$ is a whole number. The student is referred to the works of Gauss, Poinsot, and Jerret for the curious properties of C. numbers.

Co'ni, or **Cuneo,** an episcopal city of N. Italy, and capital of a province of the same name, at the confluence of the Stura and Gesso, 48 miles S.W. of Turin, with which it is connected by railway. The streets, with the exception of the principal one, which has arcades throughout its entire length, are mere lanes. The position of C. gives it a large traffic with Lombardy, Switzerland, and Germany, the merchandise from the port of Nice for these countries passing through it. Pop. (1871) 22,882.

Con'ic Sec'tions. See CONE.

Conif'eræ, an order of Dicotyledonous trees and shrubs, chiefly remarkable for the seeds being *naked*, and lying behind scales (generally woody), which make up the compound fruit called a cone (hence the name C., or cone-bearers). They also constitute the subdivision *Gymnospermæ*, or naked seeded plants. There are two sub-orders—(1) *Abietinæ*, of which *Pinus abies*, and *Araucaria* are examples, and (2) *Cupressineæ*, of which *Juniperus*, *Cupressus*, and *Taxodium* may be taken as the types. Some of the species are rather variable, and have been unnecessarily multiplied on very slight grounds. The number may be given at about 130; they are distributed all over the world, but chiefly in northern and temperate climates. The region of America immediately to the W. of the Rocky Mountains is rich in some very beautiful forms, *e.g.*, *Sequoia sempervirens* and *Sequoia* (*Wellingtonia*) *gigantea*, the latter of which is one of the largest known trees. It grows in two or three clumps in the Sierra Nevada and vicinity, in California, and though the height of these 'big trees,' as they are called in California, has been much exaggerated, the highest reaches 325 feet, and the stump of one which had fallen before the grove was discovered by the whites, is 30 feet in diameter. A house is now erected on it, in which dancing-parties are held. Neither this species, nor its close ally *Sequoia sempervirens* (the redwood), has been ever found in the neighbouring state of Oregon, or, indeed, out of California. The order possesses many excellent timber trees, which also yield resin, pitch, tar, turpentine, &c. The wood of all of them is marked with dots or discs, by which it can at once be distinguished under the microscope. The Yews (q. v.) are by some authors considered as a tribe of C. (*Taxineæ*), and by others as a distinct order (*Taxaceæ*), comprising, in addition to the yew proper (*Taxus*), *Dacrydium*, an Antarctic genus, one of which (*Dacrydium Franklinii*) is the Huon pine of Australia, and the Kakaterro (*Dacrydium taxifolium*), of the same country; while the Dimon pine (also of New Zealand) is another member of the same genus, viz., *Dacrydium cupressinum*, *Podocarpus*, and *Salisburia*. The *Gnetaceæ*, or jointed firs, are also closely allied to this order, but will be considered separately.

Coni'ine is an Alkaloid (q. v.) contained in hemlock (*Conium maculatum*), and is a volatile liquid, boiling at 168° C. It possesses a powerful, pungent odour, like that of tobacco, and is very poisonous. C. is a strong base, and forms crystalline salts with acids. Its composition is represented by the formula $C_8H_{15}N$. It has been prepared artificially.

Coniros'tres, a sub order of Insessorial (q. v.) or Perching birds, distinguished primarily by the conical shape or form of the beak, whilst the upper mandible is not markedly toothed at its apex. Of this group the Sparrows (q. v.), hawfinch or bullfinch, crows, starlings, hornbills, finches, and larks are good examples. These birds are chiefly granivorous in habits.

Co'nium. See HEMLOCK.

Conjoin'ing of Pro'cesses, a term of Scotch law. Where two or more processes in the Court of Session relate to the same matter and affect the same parties, the court may conjoin them. They are then discussed together as one group.

Con'jugal Rights, a Suit for Restitu'tion of, is a suit arising from a husband or wife, without legal cause, insisting on living separately; in which case, the ecclesiastical courts will compel them to come together, 'if either,' as Blackstone remarks, 'be weak enough to desire it.'

Conjuga'tion (Lat. *conjugo*, 'I yoke together') is the grammatical designation of the classes into which verbs have been divided, with the view of exhibiting collectively the various methods of denoting the relation of voice, person, number, mood, and tense. These relations are expressed in some languages (as in Sanskrit, Greek, Latin) by additions to and alterations upon the verb-stem; and in others (as in English, &c.) by distinct words. As the mechanism of inflections practically draws half its facts from Latin and its derivatives, we shall take Latin as an example of the former class. In Latin verbs the inflections in a C. express the voices, active and passive (sometimes called reciprocal, or middle); the numbers, singular and plural; the persons in each number, first, second, third; the moods, indicative, subjunctive, and imperative; the tenses, present, future, and imperfect, denoting incomplete action, and perfect, future perfect, and pluperfect, denoting complete action. There are also comprehended in C. indeclinable substantives, called infinitives, verbal adjectives, called participles, a verbal substantive, Gerund, and a verbal adjective, Gerundin, and the supines, the accusative, and the ablative case of a verbal noun. Every person in the Latin verb is a complete sentence, the simplest form being found in the singular of the present indicative active, where we have only the stem and the person-word, *ama-s*, 'thou lovest.' The word *scrib-er-e-ur-nt* exhibits the inflections attached to the stem to express the various verbal relations: *scrib*, the stem, signifies *write*; *er*, indicates past time; *e*, the subjunctive mood; *nt*, the person in the plural, 'they;' and *ur*, the passive voice. The ordinary Latin conjugations are four in number, distinguished by the last or characteristic letter of the stem: (1) verbs whose stems end in *ā*; (2) in *ē*; (3) in a consonant, in *u*, or in *ĭ*; and (4) in *ī*. In English, as in all the German dialects, there are two great conjugations, distinguished by the form of the preterite. The first, called the Strong C., forms the preterite from the root without the addition of any foreign element: as ride, rode; fling, flung; hold, held. The second, called Weak C., comprises verbs that form their preterites like kill, kill-ed; move, move-d; dip, dip-t. The verbs of the Strong C. are comparatively few in number, but they are all native English, and give our speech much of its peculiar strength and flavour; the Weak C., on the other hand, is recruited by all the contingents derived from other languages. (See Latham's *English Language*, ch. i. ss. 17-25, and Whitney's *Language and its Study*.)

Con'junct Persons. Under the Bankruptcy Statutes of Scotland, all those who, by their relationship to one who is insolvent, would be legally incapable of being witnesses or judges in a cause in which he might be concerned, are termed C. P. Deeds in favour of any conjunct person by the insolvent, if granted without adequate consideration, are, under statute, reducible. See CONFIDENT PERSONS, CONSIDERATION.

Conjunc'tion, in astronomy. Two heavenly bodies are said to be in C. when they occupy the same portion of the heavens, as, for instance, the sun and moon at new moon. When Mercury and Venus are between us and the sun, they are said to be in *inferior C.*, and when the sun is between us and them, they are in *superior C.* The other planets can only be in superior C. Chinese history records a C. of five planets in the reign of the Emperor Thuen-hin (2514–2436, B.C.), and but a few years past we had a very beautiful C. of Venus and Jupiter.

Conjunctions (Lat. *con* and *jungo*) are the parts of speech which join sentences and independent words. They are either (1) *Co-ordinate C.*, joining independent propositions, as *also*, *and* (*Copulative C.*); *or*, *else*, &c. (*Disjunctive C.*); *but*, *yet*, &c. (*Adversative C.*); *for*, *hence*, &c. (*Illative C.*); or (2) *Subordinate C.*, joining a principal sentence to a dependent or modifying clause; *for*, *because*, *since*, *as*, *if*, *unless*, *lest*, *that*, *whether*, &c. *Compound C.* are such expressions as *not only*, *nevertheless*, *howbeit*, *provided that*, &c.; and C. used in pairs, as *either*, *or*, *both*, *and*, *as well as*, &c., are called *Correlatives*. C., which are of comparatively recent growth, language being at first too simple to require them, have been formed by lessening the meanings of other words. Thus, *as* and *also* are contractions from the Old Eng. *eal*, *swa* ('altogether,' 'thus'); *or* is a contraction from *other*; *and* originally meant *against* (O. H. Ger. *anti*); the conjunction *than* comes from the adverb *then*; the conjunction *therefore* from a demonstrative pronoun and a preposition; the conjunction *because* from a noun and a preposition; and the conjunction *that*, from the pronoun *that*—such a phrase as 'I know *that* he is here,'

being altered from 'he is *here*, I know *that*.' (See Morris' *English Accidence*, ch. xvi., and Latham's *Eng. Lan.*, ch. xxvi.)

Conjunction of Cells, a term applied to a peculiar phenomenon of reproduction in plants, such as *Desmideæ*, &c., when, as among the *Confervæ*, two cellular filaments approach, each one of them gives forth a protuberance which unites with the opposite cell, after which the two contiguous walls get absorbed, so that an open passage is left between the two cells. Through this opening the endochrome of one Cell (q. v.) passes into the other, and after various changes becomes a *Zoospore*, and the cell-water bursting, liberates the spores.

Conjunctly and Sev'erally, a Scotch law-term denoting the form of obligation by which two or more persons become each bound to discharge the whole obligation. A creditor in such circumstances may either exact performance in part from each, or enforce the whole obligation against one, leaving him to seek relief from the rest. The corresponding term in English law is Joint and Several (q. v.). There is some difference there shown in the law of the two countries with regard to joint obligations.

Con'juring. See MAGIC and INCANTATION.

Conn, Lough, a lake in the county of Mayo, Ireland, together with Lough Cullin, from which it is separated by a narrow channel, crossed by a bridge called the Pontoon, is 13 miles long and from 1 to 3 broad, and is studded with isles.

Connara'ceæ, a natural order of calycifloral Dicotyledonous trees or shrubs, consisting of about forty-two species, natives of the tropics of America and of the Old World. The best-known of the six or seven genera are *Boswellia*, *Balsamodendron*, and *Amyris*. They are universally characterised by the abundance of fragrant resinous or gum-resinous juice which they possess. A few furnish good timber; some are poisonous; while others are bitter, purgative, or anthelmintic. *Amyris hexandra* and *A. Plumieri* are said to yield some of the *elemi* of commerce, but this is more than doubtful. Equally doubtful, according to Bentley, is the statement that *A. balsamifera* furnishes one of the kinds of *Lignum Rhodium*. *A. commophora* is believed on better grounds to be the source of African bdellium. The leaves of *Balanites Ægyptiaca* are anthelmintic; the fruits are purgative, and the seeds yield a fixed fatty oil called *Zachun* in Egypt. *Omphalobium Lambertii* of Guiana furnishes zebra-wood. For the other economic products of the order, see BALSAMODENDRON, BOSWELLIA, CANARIUM, ELAPHRIUM, and ICICA.

Conn'aught, the westmost, smallest, and most barren of the four provinces of Ireland, bounded N. and W. by the Atlantic, S. by Munster, and E. by Leinster and Ulster, comprises the five counties of Galway, Leitrim, Mayo, Roscommon, and Sligo. Its greatest length is 105 miles; its greatest breadth, 92 miles; area, 6863 sq. miles. The W. coast, indented with numerous bays and harbours, presents a great variety of the most picturesque scenery. From 1841 to 1871 the population, owing to emigration and other causes, fell from 1,420,705 to 846,213. C. is the most purely Celtic and wretched part of Ireland. It was long ruled by the O'Connors, but passed under English authority in the reign of Elizabeth, and was then subdivided into counties.

Connecticut (pron. *Connet'icut*), one of the original thirteen states of the Union, lies between Massachusetts on the N., Rhode Island on the E., Long Island Sound on the S., and New York on the W. Area, 4674 sq. miles. Pop. (1870) 537,454. It is watered by the C., the Housatonic, the Thames, the Farmington, and the Quinepiack. Much of the soil is poor; in the N.W. it is hilly; in the centre it is sandy and gravelly; but in the valley of the *C. river* there is a large tract of fertile and meadow land, extending from Wethersfield into Massachusetts, and producing large crops of hay, tobacco, maize, onions, and fruits. In 1871, 4761 acres produced 8,094,000 lbs. of tobacco, valued at $2,023,500. The farm produce of 1870 was $26,482,150. C. has varied mineral resources, as iron at Salisbury, cobalt and nickel and valuable freestone at Portland. It is noted for its numerous industries, and every stream has been utilised for machinery. The staple manufactures are clocks, carriages, arms, cutlery, plated silver, paper, copper, brass, and india-rubber goods. Banking and insurance are extensive. In 1870 the assessed value of the state was $425,433,237; state debt in 1868 was $7,324,136, and the county and town debts in 1875 were $13,995,000. The state capital is Hartford. Other towns are Newhaven, Bridgeport, Norwich, Waterbury, Middletown, New Britain, and New London. C. is celebrated (in America) for its education, literature, and theology. Early in this century it founded a school fund (from the proceeds of public lands in Ohio), now amounting to $2,046,035, and rendering common education almost free. Yale College (q. v.), in Newhaven, is one of the foremost in the United States. The Wesleyan University, in Middletown, an extensive and vigorous institution, has a reputation for learning, and Trinity College (Episcopal), Hartford, is erecting new buildings on a magnificent scale. There are also ladies' schools of a comparatively high order in Farmington, Hartford, and Newhaven.

C. ('the land of steady habits') was colonised by the New England Puritans, who arrived in Windsor and Hartford in 1633, and in Newhaven in 1638, and their churches were established by law till about 1818. Charles II. granted the colony a charter in 1661, which remained in force till 1818. During the time of James II. it was concealed for safety in the 'charter oak' tree.

Connecticut (Ind. *Quonetocut*, 'the long river'), the largest river between the Hudson and the St John, rises in 45° 15′ N. lat., and flows S. between Vermont and New Hampshire, crosses Massachusetts and the state of C., and enters Long Island Sound at Saybrook, after a course of 400 miles, and a descent of 1600 feet from its source. It is navigable to the city of Hartford (50 miles) for vessels drawing 8 feet of water. It is famous for its *shad*, a large and most delicate fish. The river in spring overflows and enriches large tracts of meadow land, and the valley presents many scenes of varied and cultivated beauty.

Connec'tive. See STAMENS.

Connective Tiss'ue. This name is given by modern histologists to a number of tissues which originate from the same primary structures in the middle layer of the embryo. (See EMBRYO.) Although widely different from each other, both chemically and histologically, in the mature condition, yet on account of this primary relationship they are usually grouped together under the name of C. T. The members of the group are cartilage, mucoid tissue, reticular C. T., ordinary C. T., usually known under the name of white fibrous, or areolar tissue, fatty or adipose tissue, bone, and one of the principal substances entering into the composition of tooth, called dentine. A description of the histological characters of these various tissues will be found under their appropriate headings. The reasons for grouping these tissues together are—(1) *Embryological.* They are formed from the same layer of the embryo. (2) *Comparative histological.* In the bodies of lower animals these tissues frequently replace each other; thus what in one animal is ordinary C. T., in another is reticular C. T., or cartilage, or bone—or bone may be replaced by dentine. (3) *Pathological.* It is found that in morbid changes nearly every member of the C. T. group may be replaced by nearly any other, either by metamorphosis or by reconstruction from the offspring of the original tissue. The C. T. group form a framework for supporting the other tissues, such as vessels, glandular cells, muscular fibres, and nerves. In disease, as has been shown by Virchow, the great German pathologist, the C. T. group is often the most active tissue of the body, and many luxuriant growths and tumours may be traced to it. According to Frey, an authority in matters relating to minute structure, the histological characters of the group of connective tissues are—The embryonic rudiments consist of aggregations of spheroidal formative cells, having no membrane, and enclosing nuclei. A soft, homogeneous intercellular matter of albuminous character is formed between these cells. In course of time the cells as well as the intercellular substance undergo changes. The intercellular matter divides into fibrous masses or fibrillæ, while the cells become short and stunted, or may unite together by long processes so as to form a delicate network. Sometimes calcification, or a deposition of earthy salts, chiefly those of lime, occurs in the intercellular substance. Coincidently with those histological changes, chemical metamorphoses also occur—the albuminous matter of an early period giving place to mucin, chondrin, or elastic matter.

Connoisseur (Fr. from (old) *connoitre*, 'to know;' Lat. *cognoscere*, 'to become acquainted with') is one whose knowledge and comprehension of art is complete enough to entitle him to

pass a critical judgment in music, painting, and sculpture, or in any of these. The word is sometimes mockingly applied to pretenders, or to *conoscitori senza cognizione*, or judges uninformed. See COGNOSCENTI.

Co'noid, a surface generated by a straight line which moves parallel to a given plane upon two fixed lines or *directors*, one of which is rectilinear. The best-known conoids are the *hyperbolic paraboloid*, both of whose directors are straight lines in different planes, and the *skew helicoid*, a familiar example of which is afforded by the under surface of a spiral staircase.

Con'quest, a term of Scotch law denoting real or heritable rights which any one has acquired by purchase, donation, or Excambion (q. v.); real estate acquired by succession being called *heritage*. When left to the destination of law, heritage descends to the heir of line, and C. ascends to the heir of C. This separation of succession can, however, only take place where the deceased has died without lawful issue, having a brother older and a brother younger than himself, or having an uncle older and an uncle younger than his, the deceased's, father; or, in the event of there being issue of one or other of these brothers or uncles, he being deceased. In such cases, heritage descends to the immediate younger brother of the deceased, or to the next younger brother of his father, or to the representatives of either, but C. ascends to the immediate elder brother, or uncle, or representatives. In all cases the full relationship by blood excludes the half. In contracts of marriage, the C. acquired during marriage, or a proportion of it, is frequently settled on the heir, or on the issue of the marriage; but under a provision of this kind, C. is held to mean only such an accession of estate as makes the husband richer, and does not therefore necessarily include all that he acquires during the marriage by singular title. See BROTHERS, LAW OF SUCCESSION AMONG.

Con'rad, a French form of the Germanic KONRAD (q. v.).

Consal'vi, Ercole, Cardinal, an eminent Italian ecclesiastic and statesman, was born at Rome, 8th June 1757. As secretary of state to Pius VII., he concluded the concordat between Napoleon and the Papal States in 1801, although he subsequently opposed his aggressions upon Rome. During the latter part of his life he distinguished himself as a reformer of abuses, abolishing monopolies and feudal taxes. He died at Rome, 24th January 1824. C., who was a moderate and sensible politician, also deserves favourable mention as a patron of literature, science, and the fine arts. See Crétineau-Joly's *Memoires du Cardinal C.* (2 vols. Par. 1864).

Consanguin'ity is the relationship of persons descended from the same ancestor. It is either *lineal* or *collateral*. Lineal C. exists between the generating and the generated; thus a man is lineally related to his children, grandchildren, and to his remotest descendants. Collateral C. exists between those who have had a common ancestor; brothers, cousins, &c., are so related. Connection by marriage is called Affinity (q. v.).

Con'science. See ETHICS.

Conscience, Courts of. These were English courts of law for the recovery of small debts. They have been almost entirely abolished. See COUNTY COURTS. For Scotland, see SHERIFF; DEBTS, SMALL.

Conscience, Hendrick, a brilliant Flemish novelist, and one of the founders of the Flemish or national school of literature, was born at Antwerp, 3d December 1812. In 1830, at the outbreak of the Belgian revolution, he entered the army and served six years. In 1837 he published his first work, *In het Wonderjaer* ('The Year of Miracles'), and at once found himself famous. In the following year appeared his great national romance, *De Leeuw van Flanderen* ('The Lion of Flanders'), and from this date he has continued annually to pour forth novels, romances, sketches of country life, &c. He was appointed Assistant-professor in the University of Ghent in 1845. In 1858 he published an autobiography in the *Revue Contemporaine*. In 1870 he gained the 'prize of literature;' in 1871 he published a romance, entitled *De Kerels van Vlanderen*; in 1874 two stories of contemporary manners, *De Keusvdes Harten* and *Eene Verwarde Zaak*; in 1875 a touching tale entitled *Schandevrees* ('The Fear of Shame'), and in 1876 *Gerechtigheid van Hertog Karel*, a story of Charles the Bold. Most of his works have been translated into all the great European tongues. C. is a fine literary artist, clear in thought, pure in sentiment, and charmingly pictorial in his sketches of national life.

Con'sciousness has been defined by Sir W. Hamilton as the recognition by the 'mind or *ego* of its own acts or affections.' This includes the whole of human knowledge, but it is objectionable as suggesting that intellectual effort or discrimination is a necessary element in C., whereas intense feeling may produce the maximum of C. accompanied by the minimum of intellectual activity. Again, Hamilton includes in C. an immediate knowledge of objects external to the mind, but present in time and space, to the exclusion of the past, the future, and the distant. This, however, is to fix scientific nomenclature with reference to a metaphysical theory. C. is simply a generic name for all human feelings (including therein the spiritual side of ideas, emotions, and volitions) 'which rise above a certain intensity.' It therefore includes the complex operation of belief, whether the belief be false or true, *i.e.*, corresponds with a real object or not. In the formation of the habits which have been called 'secondarily automatic,' we find mental trains sinking out of C., as repetition makes them easier, and therefore less in need of attention. The question is still debated whether, in such cases, the mental product is realised by purely physical changes, or whether slight modifications of C. may not be irrecoverably lost by the memory. This is closely connected with the larger question whether C. is merely the spiritual expression of parallel changes in the brain, or has itself the power of reacting upon the brain and impressing a direction upon the nervous force. C. was also applied by Reid and Stewart to the self-introspection or subjective analysis, which they regarded as the most powerful instrument of mental science. Whatever they find in C. to be 'universal and necessary,' or going beyond what experience justifies, is on this method pronounced to be a simple or ultimate deliverance of C. The 'experience' school, on the other hand, contend that 'necessary beliefs,' of which the opposite is inconceivable, are easily generated by experience and the laws of mental association.

Consciousness.—This is a mental condition for which it is impossible to give a definition physiologically. We can only state some of its conditions. It appears to depend (1) on the integrity of grey matter on the surface of the brain, which must not be torn, cut, lacerated, bruised, or compressed by accident; (2) on the absence of extensive disease of the grey matter; (3) on the absence of compression of the grey matter either by a foreign body, depressed bone, or by an effused fluid, such as serum, blood, or lymph; and (4) on a healthy quality and due supply of blood. The blood must not contain any substances which, by acting on the grey matter of the brain, cause a state of coma.

Consciousness, Double. See DOUBLE CONSCIOUSNESS.

Conscrip'tion, or compulsory military service, as opposed to the system of voluntary enlistment, was the rule in the ancient republics of Athens, Sparta, and Rome, and in modern times has been adopted by every European nation except the British. At Sparta the period of service was from the age of twenty to sixty; at Rome, from seventeen to forty-six. It was not till 1798 that Jourdan's celebrated law of C. was passed by the French Council of Five Hundred, making five years' service compulsory in the case of every able-bodied citizen, and enrolling the whole male population between the ages of twenty and twenty-five. Later on, for the purpose, it is said, of evading the obligations of the Treaty of Tilsit, Prussia commenced the 'short service and reserve' system. Under the French law, which was worked by ballot, certain personal substitutions were permitted down to 1855, when *dotation*, or the purchase of exemptions, was introduced. In 1872 compulsory personal service for nine years in the regular, and eleven years in the territorial army, was re-introduced. Sole supports of families, only sons of widows, &c., are exempted. A large portion of each year's contingent, however, is allowed to retire after six months' or one year's drill. C. was generally adopted in Europe during the Napoleonic wars, and it is part of the recent military organisations of the great powers. The Austrian law of 1868 prescribes a period of twelve years, beginning at the age of twenty-one; the German Imperial law of 1871 also requires twelve years—seven years in the regular army, five in the landwehr; the Russian ukase of 1870 declares liability for service universal, for the period of

fifteen years, including two years' furlough, and purchase of exemption at a high rate being permitted; the Italian law of 1873 declares liability for service to extend from eighteen to forty, including a furlough and the service in the local militia. In Spain, Portugal, and Belgium, exemptions from the general liability may be purchased. In Turkey this privilege is confined to Christians, the sum paid being called *bedel*. By the Canadian law of 1868, all males, except members of certain professions, are liable to serve in the militia from eighteen to sixty. C. is necessary for 'bloated armaments;' for moderate establishments voluntary enlistment appears to be more economical.

Consecra'tion, or the devoting or setting apart of persons or things to a deity, is a rite which has been practised more or less by most nations, heathen as well as Christian. Among the Israelites, not only were priests, prophets, and kings consecrated, which in the case of the first was done by washing (symbol of the putting away of the filth of sin), clothing with an official costume (symbol of endowment with the character required for the office), anointing with oil (symbol of divine life), filling their hands with a wave-offering (symbol of offering praise and thanksgiving), and sacrifices, but also the Tabernacle and everything in it, Solomon's Temple, and even private houses (Ps. xxx., title), and the walls of their cities (Neh. xii. 27). In the early Christian Church, not only were the clergy, virgins, and widows consecrated, but also churches, the elements in the Eucharist, the water used in baptism, and the Chrism (q. v.) used in the various sacraments. An inferior kind of C., or what was in some cases a part of the fuller rite, called Benediction (q. v.), was applied to a multitude of persons and things—kings, travellers, persons receiving the sacraments, churches, altars, vestments, vessels, bells, candles, ashes, palms, churchyards, houses, ships (still preserved in the 'christening' of a ship), food at meals, the first-fruits of corn, wine, and fishings, &c. Many of these consecrations and benedictions are preserved in the Roman Catholic Church. In the Episcopal Protestant churches, bishops, churches, cemeteries, and the *instrumenta* of divine service are consecrated. According to the High Church party of the Anglican Church, 'the right appreciation of the Christian practice of various benedictions is (happily) reviving among both clergy and people.' See Blunt's *Dict. of Doct. and Hist. Theology* (1875).

Conseguia'na, a volcano of Nicaragua, Central America, about 10 miles from the Pacific, on the S. side of the Bay of Fonseca. The crater is 3800 feet above the level of the country; its walls descend sheer to the depth of 200 feet, and it is half a mile in diameter. The eruption of January 1835 desolated a fertile grazing district, studded with majestic cedars, which, where not uprooted, stand out scorched and barkless.

Consent'. In all contracts in themselves good by law, it is understood that there has been the free C. of the parties to it. Thus, if, as frequently happens, it should appear that there has been a misunderstanding instead of an understanding in a nominal agreement, or that one of the parties to it is legally incapable of giving C., the nominal agreement is legally null or reducible. But if acts have been done or left undone on either side under an apparent agreement, neither can draw back. (See REI INTERVENTUS.) Questions involving proof of C. must ever continue to give rise to litigation, from the infinite variety of circumstances by which it may be proved or disproved, or by which it may be shown to have resulted from aberration of mind. Where C. is the result of essential misconception, it is of course only nominal, and therefore invalid. Even where no ground of nullity exists, C. may, under certain circumstances, be withdrawn. See CONTRACT, PROMISE.

Conserva'tion of Energy. See ENERGY.

Conservation of the Peace. Several high officers of the crown have, as regards preservation of the peace, jurisdiction throughout the kingdom. Minor officers are only empowered to act within their own jurisdiction. See CONSTABLE, JUSTICE OF THE PEACE.

Conser'vative. See WHIGS and TORIES.

Conser'vatoire (*Conservatorium*), the name by which the Continental music-schools are known. These were originally benevolent institutions, in which musical education and board were given gratuitously to poor children. They have now to a great extent lost this character, except in so far that state endowments in many cases enable them to give musical education for very low fees.

Conser'vatory (Lat. *conservo*, 'I preserve') is a glazed structure, artificially warmed in winter, in which exotic plants are grown. It is kept cooler than a hothouse, and is distinguished from a greenhouse by the plants in it growing in beds on the floor, and not in pots or tubs or on shelves. It also differs from an orangery in not having an opaque roof. The largest and finest C. in the kingdom is at Chatsworth (q. v.), in Derbyshire, the seat of the Duke of Devonshire. It is 277 feet long, 123 feet wide, and 67 feet high in the centre. It is composed wholly of iron and glass, and furnished the idea on which exhibition buildings, from that of 1851 onward, have been constructed. Among the other principal conservatories in this country are those at Alton Towers, Staffordshire, which are 3?0 feet long, and those at Mount Edgcumbe, near Plymouth, Wilton House, near Salisbury, and Kew Gardens and the Crystal Palace, near London. Among those to be found on the Continent, may be mentioned the conservatories at the palaces of Schönbrunn, near Vienna, and Sans Souci, near Berlin.

Con'serves, a name given to different kinds of confections, consisting chiefly of fruits preserved in sugar, also by druggists to palatable compounds enclosing nauseous medicines.

Con'siderant, Victor-Prosper, a French Socialist, born at Salins, Jura, 12th October 1808. He entered the *École Polytechnique* in 1826, but withdrew in 1831 to propagate Fourierism. On the death of Fourier (1837) he undertook the direction of *La Phalange*, the organ of the party, and, supplied with funds by an Englishman named Young, he made a trial of the system of the Social colony or *Phalanstère* in the department of Eure-et-Loire. But his attempts to revolutionise society signally failed. For his share in the democratic movement of 13th June 1849 he had to flee into Belgium, whence he embarked for Texas to make a new trial of his system. Here he founded a Societarian community, *La Réunion*, which, after a season of fitful prosperity, finally collapsed. C. returned to France with his family in August 1869. His writings are numerous but no longer notable. We may specify *Destinée Sociale* (3 vols. 1834-44); *Exposition Abrégée du Système Phalanstérien de Fourier* (1845); *Théorie du Droit de Propriété et du Droit au Travail* (1848).

Considera'tion, in law, is the name given to the cause or reason of granting a deed or other obligation, or of entering into a contract. Where the obligation is incurred without C., it is called *voluntary* in England, in Scotland *gratuitous*; when incurred *for C.* it is so termed in England, and in Scotland *onerous*. In England the rule of law is that a contract without C. is invalid, except under a formal deed. But even deeds may, under certain circumstances, be set aside if granted without C. In England they are ineffectual, by statute, against creditors when the granter is insolvent at the time of granting the deed. In Scotland the law is similar, no proof of insolvency being required when the deed is in favour of Confident Persons (q. v.) or of Conjunct Persons (q. v.).

Consign'ment. In mercantile law, this term is generally applied to goods delivered or transmitted by one merchant to another, or by a merchant to an agent or factor for sale, or for other specific purpose. The bankruptcy of consigner or of consignee often gives rise to questions of great legal nicety with respect to reputed ownership, and on other points connected with the rights of the parties or their creditors. See DELIVERY, STOPPAGE IN TRANSITU, REJECTION IN TRANSITU.

Consis'tory (Lat. 'a standing or waiting place,' specially used in ancient times of the place where the emperor's council met), denotes an ecclesiastical court held in some place belonging to a cathedral. It is held by the bishop's chancellor for determining matters under spiritual cognisance. Before the establishment of the Court of Probate, the C. courts granted probates of wills for Chattels (q. v.).

Consola'to del Maré (Ital. 'the consulship of the sea'), a code of maritime law, constructed on the laws and trading customs of the great commercial cities of the Mediterranean—Venice, Genoa, Barcelona, Marseille, &c. See MERCANTILE LAW.

Con'sole (Fr. *console*, 'a pier-table'), a bracket or corbel of any kind in classical architecture. It is used as a support for the cornice, or to place figures or busts upon. Frequently in the form of the letter S, it is sometimes richly ornamented. It is called also an *ancone*. See CORBEL, MODILLION, BRACKET.

Consol'idated Fund. The aggregate produce of the branches of the public revenue of the United Kingdom is paid into the Bank of England to the credit of what is called the C. F. It is chargeable with the interest of the national debt, and it is mortgaged for payment of a yearly sum to maintain the Civil List (q. v.).

Consolida'tion. When applied to Acts of Parliament, C. means the throwing of various Acts regarding the same subject into one Act; this tends to secure congruity in their provisions. In the feudal law of Scotland, C. means the reunion of the property with the superiority after they have been feudally disjoined. See DOMINIUM DIRECTUM and DOMINIUM UTILE, CRIMINAL STATUTES CONSOLIDATION ACTS, RAILWAY ACTS.

Con'sols. A portion of the British National Debt is so called. The word has its origin in the Consolidated Annuities Act of 1757. By that statute a variety of Government stocks were thrown into one fund, for which one account is kept in the Bank of England. See DEBT, NATIONAL.

Con'sonance, the pleasing effect to our ears of the combination of certain musical sounds. The physical phenomena which give rise to C. are somewhat complex, and are only now beginning to be understood. If two simple tones, not of the same pitch, be sounded together, they cause a series of compound waves in the surrounding air, which go through a continual series of changes in amplitude, and of which, therefore, the sound undergoes regular changes in intensity. The number of times in a second which the maximum loudness occurs is equal to the difference between the number of the vibrations of the notes in the same interval of time. Each recurrence of maximum loudness is called a beat. C. and dissonance differ only in degree—not in kind—and both are caused by these beats, which when moderately rapid are harsh and rough (making a dissonant interval), but when very rapid are pleasant (causing C.). The effect of the beats depends upon their *absolute number* per second; but for any given interval this will be much less in a low than in a high octave, so that in the latter the rapidity necessary to convert dissonance into C. is reached within a shorter interval than in the former. For notes in middle compass the maximum roughness occurs at about a semitone, and C. commences before a minor third is reached. The interval in which the beats are disagreeable is called the *beating distance*.

Con'sonants. See LETTERS.

Con'sort (Lat. *consors*, 'a sharer or partner of the same lot') is the title of the husband or wife of the reigning sovereign of the United Kingdom. A Queen-C. does not, as other women do, according to legal theory, fully merge her personality in that of her husband, who, according to Coke, is held to be so engrossed with state affairs that he has no time for such supervision of domestic matters as ought to be exercised by a private individual. The Queen-C. must, therefore, discharge the domestic functions which usually belong to the husband. Her privileges are almost exclusively those of precedence and of etiquette. The husband of a Queen-regnant of England does not by marriage acquire the title of C., or any English title. The title of Prince-C. was, in 1857, conferred on the late husband of Queen Victoria by letters patent. The title of King-C. has never been given to any one in England.

Conspir'acy. The Lat *conspiratio* denotes a harmony, lit. a 'breathing together' either in good or evil; in modern usage the latter sense predominates, but does not exclusively prevail. As a rule, 'conspirators' mean mischief, but men may honourably conspire to rid themselves of a tyranny. In law, the term C. has an extensive and undefined application. It infers confederacy, and for a criminal object. There are many acts which are not criminal when done by an individual, but which become so when effected by several with a common design. Thus, any one attending a theatre may express his approval or disapproval of the piece or of the acting, but if several agree to condemn a play or hiss an actor, they will be guilty of C. (2 Camp. 358). Any combination whose *object* is to injure public trade or to defeat the law is C. The punishment is fine and imprisonment at the discretion of the court. See COMBINATION.

Con'stable, from the Old Fr. *conestable* (mod. Fr. *connétable*), Lat. *comes stabuli*, 'overseer of the (imperial) stable,' a dignitary of the Roman empire, transferred to the Frankish courts, whose name was corrupted into *commestabulus* and *comestabulus* at least as early as the 9th c. Originally the commander of the royal Frankish cavalry, the C. became in the 13th c. the commander of all the military force of the kingdom; and in France particularly the name recalls some famous historical personages, both good and bad. Suppressed by Louis XIII. in 1626, the office was revived by Napoleon, who created his brother Louis Grand C., Marshal Berthier being made Vice-C. At the restoration of the Bourbons, the office was again abolished, and it has not since been restored. In England a Lord High C. was appointed shortly after the Conquest. He and the Earl Mareschal (a word of similar meaning) were joint judges of the Court of Chivalry (q. v.). The office was abolished by Henry VIII., on the attainder of the Duke of Buckingham. At coronations, and on some other great state occasions, a Lord High C. is appointed for the time. In Scotland, the Lord High C. had anciently the command of the king's armies while in the field in absence of the king. He was likewise judge of all crimes and offences committed within four miles of the king's person, or within the same distance of the Parliament, or of the Privy Council, or of any general convention of the states of the kingdom. The office is hereditary in the family of the Earl of Errol, and is reserved by the Treaty of Union, and by statute 20 Geo. II. c. 43. It confers the dignity of first subject in Scotland next to those of royal blood.

Constable of a Castle was in ancient times the keeper of a castle. In England, constables are of three kinds—high C., petty C., and special C. The office of high C. is not confined to any particular town or parish, but extends to the Hundred (q. v.) to which he is appointed. The jurisdiction of the petty C. extends to the parish or borough for which he is chosen. The special C. is an auxiliary appointed on emergencies. The general legal duties of a C. are to prevent violation of the law, and to apprehend offenders. In discharge of their duty, they may require the assistance of bystanders, who are bound to give it under pain of fine and imprisonment. A C. may break open doors to preserve peace, and he may imprison without a warrant, on a reasonable charge of felony made to him.

Constable, John, an English landscape-painter, was born in the village of East Bergholt, in Suffolk, in 1776. The son of a proprietor of several mills, he was engaged about his sixteenth year in learning the miller's business, but his father's scheme that he should inherit the mills was frustrated by his desire to become a painter. After receiving lessons from Reinagle, he was admitted a student at the Royal Academy, 4th February 1799. Many years elapsed before the charming simplicity, freshness, and fidelity of his art met with appreciation, but eventually the tide of fame set in, and he was elected an Academician in 1829. He resided latterly at Hampstead Heath, and died suddenly at 35 Charlotte Street, Fitzroy Square, 30th March 1837. Three of his finest works are 'The Corn-Field' (National Gallery), 'The Glebe Farm,' and 'Dedham Vale.' His art, says Ruskin, is 'original, honest, free from affectation, and manly in manner.' See *Life*, by C. R. Leslie, R.A. (Lond. 1843), and a letter by C. G. Constable, son of the painter, in the *Academy*, January 20, 1877.

Con'stance, or **Kostnitz**, a fortified city on the S. or Swiss shore of the lake of the same name, but belonging to the Grand Duchy of Baden, lies at the point where the Rhine connects the main sheet of water with the Untersee, about 65 miles E. of Basel by railway. It communicates by bridge with Petershausen, a suburb on the N. side of the Rhine. The most notable buildings are the fine Gothic cathedral, begun in 1052; the bishop's palace; St Stephen's Church, built in 831; the Franciscan convent, now a ruin; the Dominican monastery, now a cotton factory; and the Kauf-haus, or merchants' hall, built in 1388. C. was formerly a free imperial town. Having fallen under the bann of the empire in 1518, it was ceded to Austria, which handed it over to Baden in 1810. C. has manufactures of cotton, silk, watches, and musical instruments. It has also sawmills, and many of the inhabitants are engaged in fisheries, and in cultivating vineyards and gardens. Pop. (1873) 10,061.

Constance (Lat. *Lacus Brigantinus*, Ger. *Bodensee*), a lake of Central Europe, whose N. shore is German (Baden, Würtemberg, Bavaria), and its S. shore Swiss (Thurgau and St Gall); while its eastern end reaches Austrian territory (Tyrol). It lies from 1280 to 1380 feet above the level of the sea, is 44 miles long, and 9 broad (at its greatest), and attains in some parts a depth of 960 feet. The Rhine traverses it from E. to W. The lake is divided into two arms—the more northerly called Uberlingen Lake, and the other Zellersee or Untersee. In the course of time it has contracted itself considerably, having once extended some miles further from the beach. A singular phenomenon is its sudden rising, after a thaw, from the melting of the snow. Since 1824 there have been steamers on the lake. Its navigation, for sailing vessels especially, is dangerous when the wind blows strongly from E., S., or N.W. Numerous species of aquatic fowl, as many as sixty, it is said, and twenty-five species of fish belong to the lake.

Constance, Council of, was held at the town of C. during the years 1414-18. Its professed purpose was to bring to an end the 'great schism' in the Church, and to make a clean sweep of all ecclesiastical abuses. The council, reluctantly summoned by Pope John XXIII., who foresaw the fate that awaited him, was attended by an immense number of dignitaries. Besides the Pope himself and the Emperor Sigismund (the famous *super-grammaticam*), there were present 26 princes, 140 counts, more than 20 cardinals, 7 patriarchs, 20 archbishops, 91 bishops, 600 other prelates and doctors, and about 4000 priests. The three rival Popes of the time—John XXIII., Gregory XII., and Benedict XIII.—were deposed, and a new Pope, Martin V., was elected. Before this election, however, took place, the council formally declared itself the supreme judicial and legislative authority in the Church, but its projected 'reforms' were indefinitely postponed; for Martin V., a few months after his election, dissolved the council in alarm, lest his power should be lessened by its pretensions. The discussion of ecclesiastical reforms was first resumed at the Council of Basel (see BASEL, COUNCIL OF). How little this splendid—or perhaps one had better say *showy*—assembly really cared for the advancement of learning or the cause of truth, is seen in the iniquitous trial of John Huss and Jerome of Prague on charges of heresy. Among their bitterest enemies were some of the leaders of this *quasi*-reforming council, which is more likely to be remembered with abhorrence for the burning of the Bohemian Reformers, than with respect for its insincere and impotent schemes for the purification of the Church.

Con'stant, in mathematics, is a quantity which, entering into an analytical expression, does not vary under the conditions of the problem,—*e.g.*, the *radius* and *co-ordinates* of the centre of a sphere given in position and magnitude, *mass* in the equations of motion of a particle, the *force of gravity* in those of a projectile, the *energy* of a conservative system uninfluenced by external forces, &c.

Con'stant de Rebecque', Henri Benjamin, a French politician and journalist, was born at Lausanne, 25th October 1767. The son of a Swiss officer in the Dutch service, he received much of his education at Oxford and Edinburgh (where he met Mackintosh and Erskine), and after a good deal of European travel (in the course of which he made the acquaintance of Marmontel, Kant, and Gibbon), married and settled for some years in Brunswick. In 1795 he began at Paris his career as publicist. He supported Talleyrand and the other moderate republicans who formed the 'Constitutional Circle,' or 'Club of Safety,' opposed to the 'Clichy,' or royalist club. In 1799 he published his work on the consequences of the counter-revolution of 1660 in England, and entered the *Tribunat*, from which he was expelled by Napoleon in 1802, and even driven out of France. In company with Madame de Stael he went to Weimar, where he saw the great stars of German literature. He translated Schiller's *Wallenstein* into French. After a long stay at Göttingen, C. returned with the Bourbons in 1814, and relying on the promises of liberty in the *Charte*, supported the Government in the *Journal des Débats*. During the Hundred Days C. astonished his friends by accepting a place in the Emperor's Conseil d'État. Under the second Restoration he was more decidedly in opposition, attacking the election and press laws in the *Mercure* and the *Minerve*, and insisting in his *Cours de Politique Constitutionelle* (1817-20; new ed. 1861) on the observance of representative principles as the only security of social order. The biting sarcasm with which he had attacked the oppressive Government proceedings in the Lainé and Regnault affairs was displayed to great advantage in the discussions in the Chamber of Deputies, to which he was elected in 1819. Under Charles X. he opposed the Spanish war, the laws of sacrilege, succession, &c., and in the Revolution of 1830, along with his friends Laffite and Lafayette, took a leading part. He died 8th December 1830. In the midst of politics C. found time to elaborate his well-known *Religion Considérée dans sa Source, ses Formes, et ses Développements* (5 vols. Par. 1824-31), in which he traces the sentiment of religion through the various positive institutions which have been confounded with it, and explains the causes which have led to the growth of these institutions, and on which religion itself does not depend. His remarks on savages are especially valuable. C. left behind him a separate work, *Du Polythéisme Romain Considéré dans ses Rapports avec la Philosophie Grecque et la Religion Chrétienne* (Par. 1833). In politics his cardinal dogma was individualism, a term of dangerous vagueness, but the value of which he could hardly exaggerate during the Bourbon rule.

Constan'tia, a district of Cape Colony, S. Africa, 12 miles distant from Cape Town, on the E. and N.E. slopes of the Table Mountain range, famous for the excellence of its wine. This is due mainly to the alkalies present in the soil, but also partly to the shelter afforded to the vineyards by the encircling hills. The export (known to have reached 1,000,000 gallons about 1860) has greatly declined. The vines of C. were brought from Shiraz in Persia.

Constanti'na, a town of southern Spain, province of Seville, 40 miles N.N.E. of Seville, in a mountainous district. It has manufactures of soap and leather, and a trade in corn, wood, and wine. Pop. 7000.

Constantine', the capital of the province of C., in the French colony of Algeria, 195 miles E. by S. of Algiers, stands on a rocky height, washed on three sides by the Rummel, which rushes through a deep ravine, 60 feet broad. The town is 830 feet above the river. A wall, built of stones sculptured by the Romans, and having four handsome gateways, surrounds the city. The streets are narrow and filthy, and none of the public buildings deserve especial notice. C. has manufactures of woollen stuffs, saddlery, boots and shoes, and a trade in corn and wax. Pop. (1872) 30,330, of whom not a fourth are Europeans. C. is the *Cartha* ('city') of the Carthaginians and the *Cirta* of the Romans. It derived its present name from Constantine the Great, who rebuilt it after it had been destroyed in the wars of Maxentius.

Con'stantine I., Caius Flavius, Valerius Aurelius, surnamed the 'Great,' was the son of Constantius Chlorus, one of the joint rulers of the Roman empire, and of Helena, a woman of obscure origin. He was born at Naissus, in Dacia, A.D. 272 or 274. Instead of going with his father, whose province was Gaul, Spain, and Britain, C. remained in the service of Diocletian (q. v.), till his popularity with the soldiers roused the jealousy of Galerius (q. v.). His exploits in the distant East are recorded in an exaggerating spirit by the historians of later times, but there is no doubt that in an atmosphere of danger and distrust he acquired a wariness and strength of character, a penetration of understanding, and a courage of soul that marked him out for future greatness. When C. found that his life was really in peril, he secretly fled to his father, arrived just in time to accompany him on his expedition to Britain (305), and took part in some campaigns against the Picts or Caledonians. On his father's death at York, he was proclaimed *Augustus* by the troops, but prudently contented himself with the inferior title of *Cæsar*, thereby frustrating the malice, though he could not escape the hatred, of Galerius. For six years he remained a stranger to the rest of the empire, but full of activity within his province, which embraced Britain, Gaul, and Spain, encouraging agriculture, enfranchising the towns, improving political administration, and inspiring the turbulent Franks of the Rhineland with a wholesome fear of his power. Like his father, he ignored the edicts issued against the Christians, and thus the new religion rapidly spread in the W. of Europe. Meanwhile Galerius was ruling so tyrannically that the Romans called in Maxentius (a son of Maximianus, formerly a colleague of Diocle-

tian) to help them. He assumed the purple along with his father, defeated Severus, an obscure creature whom Galerius had invested with supreme power, and forced Galerius himself to retreat to Pannonia. But father and son now quarrelled. The former took refuge with C., then conspired against his benefactor, and in 310 was strangled at Marseille. Maxentius next made himself so hateful to the people of Rome that the senate sent a message to C. to come and save them from their Emperor. C. thereupon crossed the Alps (311), defeated the armies of Maxentius at Turin, Verona, and finally at Rome; his rival being drowned while attempting to escape (312). In the East, affairs now stood thus:—Galerius had long had a colleague, Maximinus, with the title of Cæsar, but in the place of Severus he put another called Licinius. This drove Maximinus into rebellion, and Galerius was compelled to grant the purple. His death, in 312, led to a fierce struggle between Licinius and Maximinus, in which the latter was vanquished, and soon after poisoned. The Roman empire was now (314) divided between C. and Licinius, who were brothers-in-law, the latter having married Constantia, sister of C. At first they were on good terms, but a difference of policy soon showed itself. There may have been jealousy and plotting on the part of the lesser man, but the great fact is, that in the final struggle between the old Paganism and the new religion of Christ, Licinius made himself the champion of the former, and fell with the worship of Zeus and Apollo. After two conflicts (314-315 and 323), C. remained sole master of the Roman world. Almost the first solemn act of his monarchy was to make the Christian religion the religion of the state. Everywhere churches arose and temples fell; the statues of the old divinities were gradually removed from public view; the offices of state were mainly conferred on the followers of the new faith; bishops were invested with civil authority, and money was liberally given from the imperial treasury to relieve the wants of the Christian poor. In 325 C. presided at the first Œcumenical Council ever held by the Christian Church, the Council of Nicæa (q. v.). In 330 he laid the foundations of his new capital, named after himself, Constantinople (q. v.), and after a career of enormous activity and turmoil, died at Nicomedeia, 22d May 337. The chief blot on his fame is the execution of his son Crispus, a gallant and popular youth, who was accused by his stepmother, Fausta, of incestuous designs. That many other persons perished at the same time (326) may perhaps suggest the notion of a political conspiracy being the real cause of the odious act. The story of C.'s conversion, as recorded by Eusebius, is a point on which superfluous attention has been bestowed. His character is not difficult to read. It was massive, practical, just. He weighed the influences that were moving men, and long before he proclaimed himself a Christian had realised the fact that the new religion was the strongest and purest agency in the state. It was natural he should acknowledge its claim to a divine origin. All this is consistent with an adherence to certain Pagan forms, and an indifference to theological orthodoxy. The greatness of Christianity lay in its broad life-giving power, not in distracting dogmas, and C. loved best moderate men like Eusebius, who tried to steer a middle course between the fanatics on either side. See Gibbon's *Decline and Fall*, Neander's *Kirchengeschichte*, Stanley's *History of the Eastern Church* (Lond. 1861), Manso's *Leben K.'s des Grossen* (Bresl. 1817), Keim's *Übertritt K.'s zum Christenthum* (Zür. 1862), and Burckhardt's *Die Zeit K.'s des Grossen* (Bas. 1853).

Constantine, Paulovich, a Russian grand-duke, second son of the Emperor Paul I., was born 8th May 1779. He served in Italy in 1799, and distinguished himself at Austerlitz, but held no important command till 1815, when his brother, the Emperor Alexander, appointed him generalissimo of the Polish armies. Having, in 1822, renounced his claims to the throne, his younger brother, Nicholas, succeeded on the death of Alexander in 1825. C. failed to conciliate the Poles, who broke out into insurrection in 1830. He retired to Bialystok, which he was ordered to quit. He then withdrew to Vitebsk, where he suddenly died, 27th June 1831. See Harring's *Der Grossfürst C., wie er war* (Leips. 1832).—**Constantine Nicolaëvich,** Grand-Duke of Russia, and second son of the late Emperor Nicholas, was born 21st September 1827. As Grand-Admiral of Russia, he commanded the fleet in the Baltic during the Crimean War, and at its close, as leader of the old Russian party, he strenuously opposed the concessions made to the Allies. He is President of the Council of the Empire, and chief of a regiment of hussars. He is also proprietor of a regiment of Austrian infantry, and chief of a regiment of Prussian hussars.

Constantino'ple (the Turkish *Stambul* or *Istambul* is a corruption of the Greek *Es tan polin*, 'into the city'), so named because built by Constantine the Great, occupies the site of the ancient Byzantium (q. v.). Its splendid position on the promontory which serves as a connecting link between the Eastern and Western worlds recommended it to Constantine as the site of his capital, when he had resolved on removing the seat of empire from Rome. The 11th of May, A.D. 330, is marked as the birthday of the new city, but the rites of inauguration lasted forty days. Thenceforth it became the seat of the Roman emperors till the reign of Valens and Valentinian, when the empire was divided; after which it continued to be the capital of the Eastern or Byzantine empire till its capture by the Turks in 1453. Since that time it has been the residence of the Turkish sultans. The city proper is situated on a triangular promontory on the European side of the Thracian Bosporus, or Channel of C., an arm of which, the Golden Horn, penetrating above 5 miles into the land, forms at once the northern boundary of the city and a magnificent harbour. On the opposite side, on the peninsula of Pera, are the suburbs of Galata, Pera, and Tophana, while Scutari lies on the Asiatic side of the Bosporus. There are in all eighteen suburbs. C. was formerly completely walled in, but its ancient defences have either disappeared or are in a dilapidated condition, with the exception of the inland or W. wall, a fine specimen of mural architecture. From the Golden Horn the city, built on a series of gentle hills, with its mosques, minarets, and cypresses, presents an imposing appearance; but the interior, with its narrow, crooked, filthy, ill-paved streets, swarming with hungry masterless dogs, and its ill-built houses of wood and earth, is sadly disappointing. Considerable improvement has, however, taken place in the architecture of C. of late years, from extensive quarters of the city having been destroyed by several great fires, and the spaces thus cleared having been rebuilt with substantial structures of stone. Of its 344 mosques, the most interesting is that which was formerly the Church of St Sophia, built in the reign of Justinian, though the largest and most splendid is that of Suleiman. The Seraglio, or palace of the Sultan, is of vast extent. Its principal entrance, a large and lofty gate, has given origin to the phrase 'the Sublime Porte,' all political and diplomatic business being supposed to be transacted under it. The other objects of interest are the two obelisks of the Atmeidan (the ancient *Hippodrome*), the Citadel of the Seven Towers, and numerous bazaars and caravanserais. Galata is the centre of trade, Pera is the residence of Europeans and of the foreign ambassadors, the naval arsenal is at Hassim-Pasha, and Fanar is the Greek quarter. There are 1200 elementary and 300 higher schools, 35 public libraries, and numerous charitable institutions. The manufactures of C. are chiefly in steel, arms, leather, saddlery, paper, and fez caps. In 1873 the tonnage of British and foreign vessels which entered the port of C. in cargo or ballast was about 3,000,000 tons; of those that cleared, above 3,500,000. The total number of ships that entered the port in 1872–73 was 43,582; tonnage, 4,878,500. The Turks have allowed the carrying trade in their own waters to fall in great part into the hands of foreigners. Still a considerable portion remains, for the movement of the port of C., *i.e.*, the total arrivals and clearings, for 1873, represented a tonnage of 4,340,097. An underground railway, to connect the lower part of Galata with Pera, was opened in 1875. Three lines of tramways have been established in C., and one on the Galata side of the Golden Horn. Omnibuses and cabs have also been recently (1873) introduced, and the city is thus rapidly acquiring a European character. Railway communication will soon be opened with the valley of the Danube; but it is scarcely possible to believe that the city will recover its former greatness until the rule of the Turk has passed away. Pop. (*Almanach de Gotha*, 1878) 600,000.

Con'stat, Precept of Clare. See CLARE CONSTAT.

Constella'tion (Lat. *con.* 'together,' and *stella*, 'a star'), a grouping together of stars under one denomination. The ancient astronomers gave to each C. the name of some person or thing to which they fancied the arrangement of the stars bore

some resemblance; and this method of nomenclature, convenient in many ways, was recognised and even extended by later and modern astronomers. The work of Eudoxus (370 B.C.), giving the constellations recognised in his day, is lost; but Aratus' paraphrase of it names forty-five constellations. Ptolemy in his *Almagest* enumerates forty-eight, being the catalogue constructed by Hipparchus. Hevelius added twelve; Halley, eight; Beyer, twelve; La Caille, fifteen; which, together with other minor additions, make up the number to about 107. Notwithstanding the attempts of certain pious astronomers of the middle ages to overthrow the mythical nomenclature of the Greeks and Romans (Bede, for instance, substituting the twelve apostles for the signs of the zodiac), the ancient names have continued intact to this day.

Constipa'tion is a state of the system marked by want of tone in the muscular coat of the bowel, rendering the peristaltic action of the intestines sluggish, and by a defective secretion of the intestinal juices rendering the fæces more dry, and consequently more difficult to be expelled. It is generally (though not always) caused by the kind and quantity of the food swallowed, and is very much increased by a sedentary life. The treatment depends on the cause. When due to diet, a purgative should be given, and great attention paid to the food; when due to a natural sluggishness of the bowel, such medicines as nux vomica or belladonna are productive of great benefit. C. often gives rise to headache and other serious ailments.

Constit'uent Assembly. See ASSEMBLY, NATIONAL.

Constitu'tion, in politics, signifies the system of a state on which its executive government rests, and by which its laws are made. The term may also be held to embrace these laws whether statutory or consuetudinary; the latter being the result of tacit constitutional sanction. The basis of the C. of a state may be broadly stated to be the will of its people having material power; individual influence being generally regulated in its power over the will of others by the extent of the individual's control over material resources, and by the force of his convictions. To a certain extent this constitutional basis is always inharmonious; hence it divides into political parties, each of which strives by getting the majority to direct the affairs of the state, the minority being bound to yield; without which rule in the political game government would be impossible. And the stability of the C. of a country, and the benefits which flow from that stability, depend on the good faith with which this rule is observed. In England, fierce as have been the political contests of the last hundred years—over Catholic Emancipation and Free Trade, for example—the defeated minority have happily never appealed to the last tribunal—that of physical force. How different, in this respect, has been the history of France during the same period! Whatever be the form of a country's government, even though it be a pure despotism, the basis of the government is the same, and when the force of the people is in favour of constitutional modification or change, it will effect this either by pressure on the self-modifying power of the C., or, if this be insufficient, by that radical change called a *revolution.*

In England the supreme power is divided into the legislative and executive. By constitutional fiction the former is vested in the sovereign and Parliament jointly, the latter in the sovereign alone. Really, the legislative function is exercised by Parliament (q. v.) alone; the executive by that portion of the Privy Council (q. v.) called the Cabinet (q. v.), though it does not form a recognised part of the C. of England. See RIGHTS OF THE PEOPLE.

Constitution, Decree of, a term of Scotch law usually applied to those decrees which are requisite to found a title in the person of the creditor in the event of the death of the debtor. But every decree by which the extent of a debt or obligation is ascertained is a D. of C.

Constitutions of Clarendon. See CLARENDON, CONSTITUTIONS OF.

Constitutions, Provincial, were decrees made in the provincial synods held under various Archbishops of Canterbury, from Stephen Langton under Henry III. to Henry Chichele under Henry V. The last were adopted by the province of York in the reign of Henry VI.

Consubstantia'tion. See TRANSUBSTANTIATION.

Consuetud'inary Law means the same as Common Law (q. v.), that is, law resting on custom; but much of our law derived from custom is now made statutory also. According to the doctrine of English law, the negative of custom, or Desuetude (q. v.), which is a technical term in the law of Scotland, does not render a statute ineffective. See also BATTEL, TRIAL BY.

Con'sul (*consules* = 'those who go together,' 'colleagues') was the highest office in the government of republican Rome, embracing both the entire civil authority and the supreme command of the army. On the expulsion of Tarquin this magistracy was immediately instituted—the two first consuls being Lucius Junius Brutus and Lucius Tarquinius Collatinus. The consuls were two in number, were invested with equal rights, and held office for one year. In earlier times, the chief magistrates were called *prætors*, the title C. having been introduced B.C. 305. The C. was elected in the *comitia centuriata*, presided over by a C., except when the appointment of a dictator had put the consular power for a time in abeyance. Under the Licinian law, in B.C. 366, L. Sextius was the first plebeian C.; and, after a protracted struggle between the two great classes in the state, both consuls were plebeians, B.C. 172. At first the consuls enjoyed all the privileges of the kings, except the priestly power, but they lost in succession the censorship and the judicial power. They were held in check by each C. having the power of vetoing the other, by the possibility of their being called to account at the close of their term of office, and by the power of the senate. When emergencies demanded it, the senate passed a decree *viderent consules ne quid respublica detrimenti caperet,* which invested them with unlimited power. Their outward badges of distinction were the procession of twelve lictors with fasces before them in a line, whenever they appeared in public; the *toga prætexta*, a cloak with a scarlet border; and the seat, ornamented with ivory, called the *curule chair.* At the close of the republic, the office of C. declined in power, and under the empire the C. was merely honorary, elected by the senate, and sanctioned by the emperor. Sometimes the emperors themselves assumed the consulship.

Consul, Mercantile, is an officer appointed by one state to reside in another to attend to the interests of his countrymen. Consuls are generally divided into consuls-general, consuls, vice-consuls, and consular agents. A C. should be able to speak fluently the language of the country in which he resides. He ought also to have a fair knowledge of its laws, in so far as they affect the interests of the merchants or travellers of his country. It is the duty of a C. to endeavour to obtain redress for any countryman who may appear to him to have been illegally treated within his jurisdiction; but a C. is not called on to interfere in a mere dispute between a countryman and a foreigner. If an Englishman abroad be robbed or cheated, he may go for advice to his C., who ought in courtesy to give it, but for redress he must look solely to the authorities of the place. A C. can in no case come between a countryman and the law of the country to which he is accredited; to which law the C. is himself subject. He has, however, the privileges of an Ambassador (q. v.). He can perform the acts of a notary public; deeds executed by him being valid, and held as done in England. The marriage of British subjects abroad is made valid by recording it in the books of the local British C. The salary of consuls-general ranges from £300 to £2000 a year; that of a consul from £100 to £1500; that of a vice-consul from £50 to £800. There is no office in which suavity of temper and manner is of more consequence than in that of a C. Some travellers in every difficulty, real or imaginary, apply to their C., and so encroach upon his time, and expect him to interfere when interference is useless, or worse. Such annoyance is incidental to the position, and should, therefore, be borne with equanimity. The most onerous duties of a C. are usually those connected with trade.

Con'sulate (Lat. *consulatus*, 'consulship'), the name given to the chief magistracy of the French republic after the revolution of the 18th Brumaire (q. v.). It was first conferred upon Bonaparte, Sieyes, and Ducos, by the rump of the Council of the Ancients and the Five Hundred. On December 13, 1799, Bonaparte was made First Consul, with absolute power, an income of 500,000 francs, and all the pomp and circumstance of monarchy, and held the office till 1804, when he made himself Emperor.

Consulta'tion, Legal. See CONFERENCE.

Consum'ption. See PHTHISIS.

Consumption, in political economy. In considering certain questions in political economy, it is necessary to distinguish between C. which is temporary and reproductive, and C. which is unproductive. Money spent in improving land is an instance of the former: the human labour and material so consumed will bear fruit. Money spent in war is an example of the latter: it is so much human energy thrown away. In these instances, the distinction is obvious, but it is often more or less obscure. The 'working-man's' C. of food is clearly reproductive; but then who are working—that is, wealth-creating—men? That the farmer, the miner, and the manufacturer are, none will dispute; but have not the physician who ministers to the health of these, and the author who instructs or amuses them, an equal claim to be so regarded?

Con'tact. In geometry, two curves are said to be in C. when they have *two, three*, or more consecutive points in common, constituting contacts of the *first, second*, &c., orders respectively. Two straight lines cannot be in C. without completely coinciding; and a straight line or plane can only have a C. of the *first* order with any curve or surface, being, in this case, a tangent or tangent plane.

Conta'gion (Lat. 'touching together') means a communication of disease by one individual to another. It may be caused (1) by contact with the diseased person; (2) by contact with his clothes or materials; (3) by contact with his excretions. The poison is thus conveyed from one individual to another, and then re-develops itself in the person to whom it has been carried. Contagious diseases are only propagated by the poison being conveyed in some form or other; consequently some countries are exempt from particular kinds of these—*e.g.*, Australia, from smallpox. How such diseases first arose we cannot tell; but now they only spread by a mode which does not account for their origin. As a rule, they attack the same individual only once.

Contari'ni, a noble and illustrious family of Venice, rose to eminence in the 11th c., furnished many doges, warriors, &c., to the state, and only waned with the republic itself. In 1380 the representative C. led the Venetian fleet against the Genoese, defeated them, and saved Venice.—**Ambrogio C.,** ambassador to Persia (1473-77), wrote an account of his travels, *Viaggi fatti da Vinetia, alla Tana, in Persia, in India e in Constantinopoli* (Ven. 1543).—**Giovanni C.** (1549-1605) was an historical and portrait painter.—**Simone C.** (1563-1633) and **Camillo C.** (1644-1722) were accomplished *littérateurs*.

Contempt', in law, is an offence of various kinds. The embezzlement of public money by a public officer is a C. punishable under parliamentary impeachment by fine and imprisonment. To accept a pension from a foreign prince without consent of the crown is a C. of the Queen's government. So it is to drink to the 'pious memory' of a traitor, or for a clergyman to absolve at the gallows a criminal persisting in the treason for which he is about to suffer.

Contempt of Court, threatening or reproachful words used to a judge on the bench is C. of C., punishable at the discretion of the judge with fine and imprisonment. So if a man threaten his adversary, or endeavour to dissuade a witness from giving evidence, or do any act which may affect the administration of law, the offence is C. of C., summarily punishable by the court. C. of C. may also be committed out of court, as by the publication of improper comment on a pending cause. The offender in such a case may be summoned before the court and punished summarily. The celebrated Tichborne case gave rise to much discussion respecting the law with regard to C. of C.

Contempt of Parliament is an infringement of a privilege of Parliament. These privileges are large, and are purposely kept indefinite to suit the times. In the famous contest between the House of Commons and the newspaper reporters in 1771, J. Miller, of the *London Evening Post*, was arrested in the city of London by the Speaker's warrant. Miller being brought before the Lord Mayor, his lordship declared the arrest illegal, discharged Miller, and committed the messenger for assault. The House of Commons sent the Lord Mayor and Alderman Oliver, similarly implicated, to the Tower of London, while the Speaker's messenger was tried at Guildhall for the assault, found guilty, and sentenced to fine and imprisonment. The power of Parliament to imprison ceasing at the end of the session, on the day of prorogation the Lord Mayor and Alderman left the Tower in triumph, and at night the city was illuminated. The contest ended in practically establishing the right of reporting the debates of Parliament, but the resolution affirming that to do so 'is a notorious breach of the privileges of the House,' remains unrevoked on the journals; and every now and then this opposition between the legal theory and that which has become established usage gives rise to perplexity. See PARLIAMENT.

Con'ti, House of, a branch of the house of Condé (q. v.), which took its title from the small town of C., not far from Amiens.—**Armand de Bourbon,** first Prince of C., the brother of the great Condé, was born in 1629. Although of a feeble constitution, and originally intended for the Church, he took to a military career, first as the opponent, and next as the ally, of his brother, and distinguished himself in Calabria. He retired from the world in 1657, gave himself up to works of piety, and died at Pezenas in 1666.—His eldest son, **Louis Armand,** who was born in 1661, died of smallpox in 1685. Having no children, he was succeeded by his brother, **François Louis,** born at Paris in 1664, and by far the ablest of this family. He was possessed of the highest military talents, which would have been displayed to more advantage had he not, during the greater part of his life, been under a cloud of royal displeasure. As it was, he distinguished himself in Hungary, and, under his friend Luxemburg, at the battles of Steenkirk and Neerwinden. In 1709 Louis XIV., who had been persuaded by the great Condé before his death to pardon C., appointed him to the command of the army in Flanders, but he died in the same year. His scientific attainments were considerable, and as he had many popular qualities, he was much regretted by the French nation. Saint-Simon, in his *Mémoires*, has given a fine sketch of his character and appearance.—His son, **Louis Armand** (1695-1727), had the cultivated tastes, if not the brilliant genius of his father, but unfortunately he succumbed to the gross dissipations of the Regency.—**Louis François** (1717-76), son of the preceding, revived the military fame of the family, signalising himself in the war with Austria and Sardinia; but he had the misfortune to incur the aversion of Madame de Pompadour, and during the Seven Years' War languished in retreat, while the French troops were being led by a Soubise. The H. of C. became extinct in the person of his son, **Louis François Joseph** (1734-1807), who died in Spain.

Con'tinent (Lat. 'holding together'), a term usually applied to the great land masses as distinguished from islands. Ordinary speech recognises five continents—Europe, Asia, and Africa constituting the Old World, and America and Australia the New World. Strictly speaking, the Old World constitutes but a single C., the separation of Africa from the mass by the Suez Canal being merely artificial. The New World is also a single C., though sometimes the two Americas rank each as one. In the midst of seeming irregularity certain uniformities have been long observed. Bacon remarked that the continents ran out in points towards the S. and broadened towards the N.; Joh. Reinh. Forster made these southern promontories the extremities of mountain ranges, while archipelagos lay over against their eastern sides, their western being hollowed out by large bays. Steffens recognised only three continents, consisting each of two land divisions united by an isthmus, having an archipelago on one side and a peninsula on the other. These are (1) America; (2) Europe, with Western Asia and Africa; and (3) the remaining part of Asia and Australia, formerly connected by an isthmus, which was disrupted in later times. Ritter notices that the greatest expansion of the land of the eastern hemisphere is from E. to W.; of the western, from N. to S. Humboldt calculated the height of the centre of gravity of the land masses, with the exception of Africa, at 1007·267 feet. A special meaning of *the C.* is the mainland of Europe as opposed to England.

Continen'tal Sys'tem is a name given to the method devised by the first Napoleon for cutting off connection between England and the Continent. It began with the 'Berlin Decrees,' issued November 21, 1806, declaring the British Islands blockaded, and prohibiting correspondence, commercial or otherwise, with them; declaring all merchandise belonging to Englishmen a lawful prize, and even Englishmen themselves, found in a

country occupied by French troops or by their allies, prisoners of war. England retorted with an Order in Council January 7, 1807, prohibiting all neutral vessels from entering any port belonging to France or her allies, and confiscating, with its cargo, every ship that violated this order; and this was followed in the end of the same year by another order, placing under the same restrictions as if they had been blockaded all harbours and places of France, and her allies in Europe and the colonies, as well as every country with which England was at war, and from which the English flag was excluded. After this, numerous opposing orders were issued on both sides, but, on the fall of Napoleon, the C. S., which had helped to increase the hostility to him, was given up.

Contin'gent, a word of ambiguous signification, but applied usually to the quota of troops furnished by tributary or allied states to the common army. The Indian army, during the Mutiny, had several contingents, whose disloyalty seriously injured the general efficiency.

Contingent, a term of English law, having a variety of applications.

Contingent Legacy.—If a legacy be left to any one on the condition of his attaining the age of twenty-one, it is C.; and if he die before that age the legacy lapses.

Contingent Remainder is when an estate in remainder (see ESTATE and REMAINDER) is limited to take effect either to an uncertain person or upon an uncertain event.

Contingent Use is a use limited in a conveyance of land, which may or may not happen to vest according to the contingency expressed in the limitation of the use.

Contingent Debts are debts due in a certain event. Creditors in such debts are in Scotland allowed to rank on the estate of a bankrupt. A discharge under the sequestration statute in Scotland is effective against C. D., but in England the rule is the other way.

Contingent Processes.—In Scotland, when processes are likely to throw light on each other, the first enrolled is held to be the *leading process*, and those subsequently brought into court may be remitted to the same judge or division (see SESSION, COURT OF) *ob contingentiam*.

Continued Fractions. See FRACTIONS.

Contor'n'ate (Ital. *contorno*, 'the outline of a design'), an ancient bronze medallion, having a curved furrow on each side, and supposed to have been struck in the time of Constantine and his successors.

Contort'ed Strata, a name applied in geology to the appearance presented by some beds of rocks, in which they exhibit a twisted aspect, their edges presenting crooked and curved lines. This appearance is said to be due to lateral pressure, or to subsidence and pressure of *curved* surfaces.

Con'tra (Ital. 'opposite to'), a term often applied in music, in the sense of lowness or depth, as in Contra-Bass (q. v.).

Contraband Goods are goods imported or exported without paying legal duties—against the 'ban' or proclamation of law. When the buyer of C. G. knows them to be contraband, he has no claim for delivery, nor action of damages for breach of contract. Nor is an action competent on a bill of exchange granted for C. G. in the hands of a drawer, or of his trustee. See SMUGGLING.

Contraband of War is a term applied to certain commodities relative to war, and to trading in them with the belligerent states. A neutral state may carry on ordinary trade with a country at war, except with a port under Blockade (q. v.), but the trading-vessel must carry no C. goods. These are, generally, all implements or stores pertaining to war by land or sea. Whether an article of peaceful commerce, but which is also of importance in war, is C., is a question which has given rise to much discussion, especially relative to coal—a superior supply of which would now often give one power so great an advantage over another. Lord Chelmsford said in the House of Lords (16th May 1861) that any Englishman fitting a privateer to assist the Southern States of America in the war then going on would be guilty of piracy; but it is not held that this would apply to the crews of vessels carrying goods C. of W.; but were they captured by the belligerent state within its jurisdiction, they might be treated as that state would treat its own subjects in the same circumstances.

Contra-Bass, or **Double Bass**, the lowest stringed instrument. The C.-B. used in this country has three strings tuned in fourths, the lowest of them being tuned to the A on the third ledger-line below the bass staff. The German C.-B. has a fourth string tuned to the E below this A, which gives it some most valuable additional notes.

Con'tract. A C. is defined by Erskine to be 'the voluntary agreement of two or more persons, by which something is to be given or performed on one part, for a valuable consideration, either present or future, on the other part.' To this we would add that there can be no such thing as an '*in*voluntary agreement.' (See AGREEMENT, CONSENT, CONSIDERATION.) A C. by which the parties, or any of them, bind themselves to do what is impossible, or illegal, or immoral, is null in law; but all facts in themselves legally possible may be made the subject of obligation, and though performance be beyond the power of the contracting party, the fact will not free him from liability in damage for non-performance. In England, contracts put into writing under hand and seal are technically called *deeds* or *specialities*; and those which are merely parole, or in writing not under seal, are called *simple* contracts. In support of an action on simple C. the creditor must prove that it was founded on a *sufficient consideration*. See DEED, COVENANT, CONSIDERATION.

Contract of Marriage.—Under the usual form of C. of M., property settled upon a wife is protected against the creditors of the husband. She has also power to dispose of the principal by will. A man about to be married may secure a provision for his wife 'in consideration' of the marriage; but he cannot defeat the rights of creditors by post-nuptial C. See MARRIED WOMEN, PROPERTY OF.

Contractil'ity is a vital property manifested by certain living substances both in the vegetable and animal kingdoms. By virtue of this property, these substances change their form, push out and retract processes, and they may also move from place to place. It is manifested by all living protoplasm, whether obtained from vegetable or animal living forms. It is seen in many of the humbler forms of life among the protozoa, in the colourless blood corpuscle, in the spermatozoon, in the cilium, in muscular fibre, and in minute capillary vessels. At one time it was supposed that the C. of muscular fibre depended on the nervous system. The old view of Haller, however, is that generally adopted by physiologists—namely, that C. is a property inherent in the ultimate elements of muscular tissue. See BLOOD, CAPILLARIES, CILIA, MUSCULAR FIBRE, and SPERMATOZOA.

Contrac'tions. The great labour of writing out complete copies of ancient works by hand caused the adoption of numerous C. in the manuscripts. These are naturally made in the most frequently-recurring words and combinations of letters, and though for the most part quite evident, they have caused considerable difficulty in the correct interpretation of many passages. These C. were introduced into the earliest printed books, and continued in use for several centuries after the invention of printing, and they appear in those reprints of the books of the middle ages that have been of late so extensively issued. C. have been arranged in various classes, of each of which we give a few examples. A straight line marked above a letter indicates the omission of *m* or *n* following it: thus quā = *quam*, and nō = *non*. A crooked or circumflex line above or through a letter indicates the omission of one or more letters at that part of the word: thus dñs or dŝ = *dominus*, grâ = *gratia*, Ɖ = *David;* and sometimes a straight line is used in the same way, as in the Latin terminations *unt, int, erunt*, &c., where regt = *regunt*, and fuert = *fuerunt*. The sign ⁿ above a letter shows that *er* or *re* has been omitted: thus m̃cator = *mercator*, and t̃s = *tres*. The absence of the final letters of a word is indicated by the marks ꝯ, or ', or . : thus M' = *Manius*, and mag. = *magister*. A vowel written small above a contracted word indicates the omission of a consonant, and a consonant so written the omission of a vowel; thus gᵃtia = *gratia*, and figᵘa = *figura*. One or more letters are frequently run into another, as in the case of the diphthongs. Numerous symbols of an almost arbitrary character are employed to represent various syllables or words: thus quiq, = *quibus*, and ÷ = *est*. A table of the C. in old Greek typography is contained in the Greek Grammar of Professor Geddes.

Contraven'tion, in Scotch law, denotes any act in violation of a legal condition or obligation. The term is specially applied to an act by an heir of entail in opposition to the provisions of the deed, and to acts in violation of Lawburrows (q. v.).

Contrayer'va, a medicine derived from the root-stock of *Dorstenia contrayerva, D. Houstoni, D. braziliensis,* and other species of plants belonging to the Mulberry order (*Moraceæ*). They are natives of S. America, Mexico, and the W. Indies, are dwarf, perennial, and herbaceous, and are generally found growing in high rocky places. Dorstenias are distinguished by a peculiar inflorescence, having a broad concave receptacle containing both male and female flowers. The root-stock, which is the part used, is of a reddish-brown colour with numerous long yellow fibres. It has an aromatic odour, a warm, pungent taste, and is used chiefly in America as a tonic, stimulant, and diaphoretic.

Contribu'tion, in its legal sense, is generally applied to contributions made for equalising loss incurred by sacrifice made for the common safety in a sea-voyage. See AVERAGE.

Con'tumacy, a term of Scotch law denoting disobedience to any lawful summons or judicial order. In a civil case the only consequence is that decree will be given against the defender. In a criminal process, C. is punished by sentence of Fugitation (q. v.). The equivalent term in English law is Default (q. v.). See DECREE IN ABSENCE.

Conular'ia, an extinct genus of Pteropodous mollusca, remarkable for its large size as compared with living Pteropods. Specimens of the fossil shells of C., of which eighty-three species are enumerated by Barrande, chiefly from Palæozoic rocks (beginning with Silurian formations), may attain a length of a foot, and a breadth of over an inch. The genus also extends into the Mesozoic rocks, and seems to die out in the Lias. The shell is straight, tapering at the end, of four-sided form, with its surfaces striated. Occasionally its cavity may be divided internally. *C. ornata* from the Devonian rocks is a familiar species.

Convallar'ia. See LILY OF THE VALLEY.

Con'vent. See MONASTERY.

Conven'ticle (Lat. *conventiculum,* dim. of *conventus*) originally meant a secret assembly of the monks of a convent, generally to secure the election of an abbot. In its modern sense, it was originally applied to the meetings of the followers of Wiclif, but came latterly to mean any assembly for worship of those who departed from the Established Church, and in this sense is associated both in England and Scotland with the coarse tyranny of the Stuarts.

Conven'tion of Estates. In Scotland, before the Union, a C. of E. of the kingdom used to be summoned to impose taxes in any emergency. These conventions were formed by any members of the three Estates of the Kingdom (q. v.) who could be quickly assembled, and without the formal citation required in summoning a regular Parliament. The power of the Convention was limited to the disposal of the special business for which it was convened. Regularly the Estates could be convened only by royal authority; but when necessary, they met without it, as in the Convention for settling the government at the Revolution of 1688. See CONVENTION PARLIAMENT.

Convention of Royal Burghs. See BURGH.

Convention Parliament. An English Parliament convened without the royal authority is so called. Its acts are, according to the theory of the constitution, invalid without ratification by a Parliament convened by writ of the sovereign. The Parliament which restored Charles II. was a C. P., so also was that which disposed of the crown at the Revolution of 1688. The acts of these Parliaments were subsequently ratified by a Parliament legally convened. See CONVENTION OF ESTATES.

Conven'tional Obliga'tion is, in Scotch law, an obligation resulting from agreement. The term is generally used in contradistinction to *natural* or *legal* obligation, which arises from the operation of law independently of contract.

Conver'gent and Diver'gent Series are infinite series, which in the former case, however far taken, never reach a certain finite value, though they may be made to differ from it by a quantity less than any given quantity, and which in the latter case may be made of greater value than any given quantity by taking a sufficient number of terms. $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots$ is a case of a converging series, the limiting value of which is 2; $1 + 2 + 4 + 8 + \ldots$ is an example of a diverging series, which has no limiting value, however great.

Conversa'na, a town in the province of Bari, S. Italy, 19 miles S.E. of the town of Bari, has a trade in the wine, oil, flax, and cotton which the district produces. Pop. 10,000.

Conversion (Lat. *conversio*) is, in logic, the transposition of the subject and predicate of a proposition. Universal negatives and particular affirmatives are converted by *simple C.—e.g.,* 'No A is B,' the *converse* of which is 'No B is A,' and 'Some A is B'—*converse,* 'Some B is A.' Universal affirmatives are converted by *C. per accidens,* by changing their quantity—*e.g.,* the *converse* of 'All A's are B's' is 'Some B's are A's,' not 'All B's are A's,' which would not be *necessarily* true. Particular negatives are converted by transferring the negative from the Copula (q. v.) to the predicate—*e g.,* the *converse* of 'Some A's are not B's' is 'Some not B's are A's.' C., by contraposition, may be applied to universal affirmatives—*e.g.,* 'All A's are B's,' *converse* —'All not B's are not A's.'

Con'vex. See CONCAVE.

Convey'ance is, in law, a deed by which a right is either created, or transferred, or discharged.

Conveyancer, one whose business it is to prepare deeds of Conveyance (q. v.). In England the C. is generally a barrister, commonly belonging to the Equity bar. In Scotland it is generally the law-agent who prepares deeds of conveyance; but there the term C. is often used to denote one whose special business it is to prepare deeds, while *agent* denotes one who specially devotes himself to the conduct of lawsuits. (See ATTORNEYS and SOLICITORS.) Any one may act as a C. who chooses, but so to do involves responsibility.

Conveyancing is the preparation of deeds for the transference of property. Great legal skill is required for this, there being certain parts in deeds, any error in which is fatal to their validity. (See SUBSTANTIALIA, ERROR IN ESSENTIALS.) No clearness of ordinary language will avail in C.; the terms used, to be effectual, must be legal. (See COMMON FORMS.) Usually the term C. is in England and in Scotland limited to the transference of real (Scotch *heritable*) property. For England, see COPYHOLD, FEE, ESTATE IN FREEHOLD. For Scotland, see CHARTER, DISPOSITION, REGISTRATION, SASINE.

Con'vict. Any one found guilty on a criminal charge may be so called; but with us the term has come to be restricted in its application to those whose crime is punishable with *penal servitude;* a sentence which was some years ago substituted for that of Transportation (q. v.). There are C. establishments in various parts of England. In these, the C. is generally employed on public works, such as the breakwater, quarries, and fortress at Portland, and the works at Chatham and at Portsmouth. The treatment of the C. has ever been a subject of legislative difficulty; the difficulty being how to make the punishment sufficiently severe for the protection of the community without injuring the mind or body of the C. Without disputing that these are the ends to be sought for in so far as they are consistent with each other, it may seem a little inconsistent that the law should be so careful of the mind and body of the C. sentenced to 'penal servitude for life,' when we consider that that sentence is the most severe but one which the law can give, that one being *Death.* It has been found that the negative object of doing no injury to mind or body was inconsistent with the prison discipline of prolonged solitary confinement. Males as a general rule broke down under it at the end of about nine months; females did not succumb usually till the lapse of a few months more. After about nine months of seclusion the convicts are now associated, under careful inspection, in some profitable mechanical work. According to the *Thirty-third Report on Prisons in Scotland for* 1871, 'the disposing of the prisoners for religious instruction, according to the denomination to which they profess to belong, still creates difficulties. One form of trouble was the profession of belonging to no religion; another arises out of requests to be

transferred from one religious register to another, the probable motive of such a request being usually the accomplishment of some scheme.'

Convoca'tion was at one time applied to any assembly of clergy, as a diocesan synod or a provincial council. It is now confined to the assembly of bishops and clergy of the Anglican Church summoned by the mandate of the archbishop. From the Magna Charta to the 37 Hen. VIII., this body assessed itself and the clergy whom it represented for public aids without parliamentary sanction. By the celebrated *Præmunientes* clause, Edward I. and his successors had endeavoured to convene the proctors of the clergy in Parliament. This failed, but by the Act of Submission (25 Hen. VIII. c. 19) the C. was forbidden to meet, confer, promulgate, or carry into execution (as regards canons) without the royal licence, or to do anything contrary to the prerogative, the common law, statute, or custom. In 1665 the taxation of the clergy was finally transferred by Clarendon to the Commons; hence the right claimed by the clergy to vote in parliamentary elections, although it has been settled since 1553 that no member of C. can sit in Parliament. After preparing the Act of Uniformity the C. gradually fell into disgrace and impotence; and its criticisms on Toland, Burnet, Clarke, Whiston, and chiefly Hoadley (in the Bangorian controversy), led to its being practically suspended from 1717 to 1840. Burke said its function was to pay 'polite ecclesiastical compliments' to the king and then to dissolve. Lately it has shown signs of life on the subscription and baptismal sponsor questions, the new lectionary and the ritual question, which it has been considering under general and special letters of business issued by the crown in 1872. The C. of the province of Canterbury meets in St Paul's. It consists, approximately, of twenty-two deans, twenty-four proctors of chapters, fifty-three archdeacons, and forty-four proctors for the parochial clergy. Only two proctors are allowed for the parochial clergy of each diocese; and only parsons, vicars, and perpetual curates can vote, stipendiary curates, deacons, and the laity being incapable of election. Colonial bishops do not appear in C. The Lower House proceeds to the election of a prolocutor, *organum cleri* or *Referendarius*, which takes place in the Jerusalem Chamber. Business is brought forward under the name of *Gravamina* or *Reformanda*. Important constitutional demands may be in the form of a petition to king or Parliament, and are called *Articuli cleri*. The deliberations of the Lower House are chiefly conducted through committees, but the Synodical Act requires the presence of the lower clergy in the Upper House. The Lower House has no right of initiative, but it has a final *veto*. Proxies may be used by members who are not proctors. C. generally sits during the same time as Parliament; it is prorogued by a schedule of continuation signed by the archbishop, who presides in the Upper House, and intimated by the prolocutor to the Lower House. The dignity of C. is secured by various penalties of excommunication contained in the canons of 1603. A canon of C., even when approved of by the sovereign, does not bind the laity, who can be bound only by an Act of Parliament; it, however, binds the clergy *in re ecclesiastica*. Formerly an appeal lay to the Upper House from the ecclesiastical courts in matrimonial, testamentary, and tithe causes. In 1864 C. declared *Essays and Reviews* heretical; it has no power to proceed against heretics.

Convolvula'ceæ, the Bindweed order, a natural order of Dicotyledonous plants belonging to the division *Corolliflora*. Altogether about 700 species, and forty-six genera are known. Jalap is produced from the root of *Exogonium* (*Ipomœa*) *Purga*, *Batatas edulis* is the sweet potato, and the various species of *Convolvulus* (q. v.) yield important medicinal substances. The species of this order are abundant in tropical countries, but rarer in cold ones. Most of them twine around other plants, and are frequently seen among weeds not far from the sea-shore.

Convol'vulus, a large genus of twining or trailing annual and perennial plants, widely distributed, typical of the order *Convolvulaceæ*. Most of them have showy flowers, expanding during the early part of the day, and owing to the presence of a peculiar resin are purgative. *C. Scammonia* furnishes Scammony (q. v.). *C. dissectus* abounds in hydrocyanic acid, and it is believed that it forms one of the species from which the 'liqueur noyau' is prepared. There are many others which possess in a more or less degree the same qualities, and which are cultivated in our gardens for the beauty of their flowers. *C. Scoparius*, a shrubby species of the Canary Islands, is one of those which yield rosewood.

Con'voy (Fr. *convoyer*, 'to conduct'), a naval and military term, meaning, in the former sense, a vessel or fleet appointed to escort merchant ships in the time of war, or, during peace, to protect them on seas infested by pirates. In the military sense, a C. is a detachment of troops appointed to guard provisions, ammunition, or money in the course of transit. The term is also applied to the train of waggons laden with these stores.

Convul'sionaries, an extreme sect of the Jansenists, originating in France about 1730. They met in the outskirts of Paris, at the tomb of one Francis, whose violent asceticism they imitated. The C. pushed fanaticism to frenzy, and finally ruined Jansenism by the absurdity of their excesses. In 1733 their suppression was decreed by law; but it was many years before this could be effected.

Convul'sions, a form of disease common among children. It consists in violent, sudden contortions of certain muscles, occurs in spasms, is quite independent of the will, and is accompanied by insensibility on the part of the sufferer. It may last from a few minutes to some hours. C. may be caused by inflammation of the brain or of its membranes, by a depraved condition of the blood, by disease of the kidneys, when the effete products of the system are not eliminated from the blood (uræmic C.), or it may be due to irritability of the nervous system, produced by teething, worms in the intestines, &c. The treatment varies with the cause. When the bowels are constipated, an active purgative, as scammony or jalap, together with a cold lotion applied to the head, may prove very beneficial. If the disease is caused by worms, these must be removed by proper remedies; a warm bath often does good. In severe cases inhalation of chloroform, administered by a physician, is an excellent application.

Con'way, or **Aberconway**, a picturesque town in the N.E. of Caernarvonshire, N. Wales, at the mouth of the Conway, 12 miles E.N.E. of Bangor, and a station on the Chester and Holyhead section of the London and North-Western Railway. The principal objects of interest are the old wall with its battlements, the splendid old castle, reared in 1283 by Edward I. as a defence against the Welsh; the chain-bridge, constructed by Telford, and the tubular bridge, in 1848, by Stevenson for the proprietors of the Chester and Holyhead Railway. C. has some coasting trade, chiefly in slates, and a little shipbuilding; but it owes its recent prosperity mainly to the beauty of its scenery, which makes it a favourite summer resort. It unites with Caernarvon, Bangor, Criccieth, Nevin, and Pwelheli in returning one member to Parliament. Pop. (1871) 2620.

The river *Conway* (Cymr. *Cyn-wy*, 'chief water,' the *Toisobius* of Ptolemy) rises in a small lake, *Llyn C.*, on the borders of Merioneth, amidst rocky moors, flows in a northerly direction, receiving lesser tributaries from the E. and from the Snowdon range on the W. Its scenery is perhaps the most romantic in Wales. After a course of 30 miles, it falls into Beaumaris Bay, in the Irish Sea. The C. is navigable for ships of 100 tons 10 miles above its mouth.

Co'ny, the scriptural name of a mammal, the *Hyrax Syriacus* of Syria and Palestine, usually included in a distinct order of mammalia—*Hyracoidea*—but sometimes classified with the rhinoceros, on account of similarity in the molar teeth. No canine teeth exist; the lower incisors are sharp, curved, and grow from permanent pulps. The front feet are four-toed, the hinder three-toed, and the toes have hoof-like nails. No clavicles exist. The nose and ears are short, the tail is rudimentary, and the placenta is deciduate and zonary. These animals live in holes in rocks, and average rabbits in size. The *Hyrax Capensis* of S. Africa is another species. See also HYRAX and DAMAN.

Cony'za, a genus of plants of the natural order *Compositæ*, the most familiar of which is *C. squarrosa* (or, as it has been called, *Inula C.*), is well known in England as Fleabane and Ploughman's spikenard. The first name refers to the property, which it is widely believed to possess, of driving away fleas and other insect pests. The second popular name is probably derived from its somewhat aromatic odour. It is a common hedge plant in England and most parts of Europe.

Co-ob'ligants, though each bound to a creditor for the whole of a debt, are liable proportionably amongst themselves; and any one paying more than his share is entitled to relief from the rest. See CONJUNCTLY AND SEVERALLY, CORREI DEBENDI, JOINT AND SEVERAL.

Cook, Captain James, the son of an agricultural labourer, was born at Marton, Yorkshire, October 27, 1728, and apprenticed to a haberdasher at the fishing-town of Straiths. His employment was uncongenial, but the sea was before him. After being employed some time in coasting vessels, he entered the royal navy, in which his progress was rapid. He was employed to survey the coasts of Labrador and Newfoundland, and was afterwards commissioned by the Royal Society to command an expedition to the Pacific. C.'s ship was the *Endeavour*, and setting sail in her on the 26th August 1768, he successively visited Tahiti or Otaheite, New Zealand, discovered and took possession of New S. Wales, sailed W. between New Guinea and Australia, and past Java, &c., to the Cape of Good Hope, arriving in British waters 12th June 1771. This voyage round the world was productive of great scientific results. In July 1772 he commanded the *Resolution* and *Adventure* on an expedition to the Pacific and Southern Oceans, from which he returned 30th July 1774. Of this long, successful, and most interesting voyage, C. has himself given an account in his *Voyage towards the S. Pole and Round the World in H.M. Ships 'Resolution' and 'Adventure'* (7 vols. Dub. 1784). On 12th July 1776, C., in the *Resolution*, accompanied by Captain Clerke in the *Discovery*, sailed on a voyage in search of the N. W. Passage. He proposed to discover this passage by making for Behring's Strait, and sailing from the Pacific to the Atlantic. Beaten back by ice, only, however, after making many valuable discoveries, C. was stabbed in the back by the savages on the shores of Hawaii, 14th February 1779. See Kippis's *Life of C.* (Lond. 1788).

Cook'ery, the art of preparing for use the various articles used as food by the human family. The first object aimed at in cooking operations is to render food more easy of assimilation to the human system, next it is sought to make food more palatable, and C. also is concerned with the presentation of food in an agreeable form. There is an almost endless diversity in the sources from which the food of mankind is drawn, and at first appearance it might be supposed that alimentary substances are so varied as to defy any classification or definition. The art of the cook to appearance further complicates food by combining various substances, and so treating them as to present made dishes under an endless variety of guises. Notwithstanding all this, the number of alimentary principles is very limited, and some knowledge of them tends very much to simplify the essentials of C., and to reduce to order the chaos presented by an ordinary C.-book.

Under the head of FOOD will be found a classification of the alimentary principles which must enter into every perfect human diet. Of these, the cook is concerned with, first, the nitrogenous or albuminoid substances, such as the fibrin of flesh, the albumen of eggs, the casein of cheese, and the gluten of flour and meal, and, secondly, with the non-nitrogenous or carbonaceous elements, as the fat of oils and butter, the starch of flour and other vegetable substances, and sugar derived from various sources. The proportions in which these substances should enter into a proper diet we learn from experience and physiological investigation, and it is the function of the cook to prepare them in view of such knowledge in the manner least wasteful and most nutritious. Food is chiefly prepared by submitting it to high heat, as by boiling, roasting, baking, broiling, stewing, &c. (See these headings, and also BREAD.) The object attained in all cases is much the same, but differences of flavour result from the various methods of preparation, which have considerable influence on the sapidity and relish of food. By the action of heat albuminous substances are coagulated, as in boiling an egg, but if this action is carried too far, the albumen becomes hard, dry, and indigestible. The natural juices within a piece of meat are retained in it by the rapid coagulation by high heat of the albuminates on the surface sealing it up. The action of heat on starchy substances, such as flour, causes the expansion and rupture of the starch granules, and partly changes them into a soluble condition, thereby rendering them fit for assimilation and digestion. Generally tissues, both animal and vegetable, are rendered softer or more easily masticated by the action of heat in cooking, and being presented to the digestive organs in a state of minute subdivision, are readily dissolved and digested. In the preparation of food, it is necessary to attend to the compatibility of certain substances as to flavour and character. Obviously herrings and preserved fruits are mutually destructive in point of flavour, and onions with custard are equally incompatible; but there are finer shades of difference than these, and it is a point of great but frequently overlooked importance to treat food so as to preserve and develop its flavour and sapidity. Without the most scrupulous cleanliness this is impossible, and cleanliness is the first essential of good C.

There is no art on which human health, happiness, and comfort are more dependent than on C., and in no direction can greater economy and saving be exercised than in dealing with food. A knowledge of the essential nature of the various articles of food, and of the proper method of treatment to turn them to the best account for the use of human beings, are of priceless consequence to any housewife; but such knowledge does not come, as too many imagine, by a species of intuition. In respect of this most essential branch of domestic economy, British housewives have hitherto been very backward, and the general amelioration of circumstances which has extended to all classes has too much resulted in increased wastefulness and misdirected expenditure. Public attention has now been prominently drawn to the importance of elementary knowledge of the principles of food and C., and attempts are being made in various directions to supply the want. A National School of C. has been established in London to teach the cooking of meals suitable for all classes of society, and throughout the chief towns affiliated schools have been instituted. The subject of C. is also receiving encouragement in elementary schools, under the code of regulations in operation in connection with the Education Department. With advancing civilisation, and increasingly artificial habits of life, a knowledge of the best methods of treating food becomes daily more indispensable to all classes.

In his primitive state the range of man's food was limited, and his cooking operations necessarily simple. Probably the earliest inhabitants of the world lived on roots, fruits, and the products of the chase, without submitting their food to any cooking process, but at a very early date we find our ancestors cultivated cereals and prepared them for food by roughly bruising the grain and parching it on hot stones. Actual baking of bread was also practised in very early prehistoric times, as is testified by remains of baked bread found among the relics of ancient Swiss lake-dwellings. The art of C. was carried to considerable perfection among the ancient Egyptians, and generally as nations progressed in civilisation, especially if accompanied by wealth and luxury, C. was studied and carefully regarded in proportion. A great variety of dishes and elaborate banquets of the Athenians are described in *The Deipnosophists* of Athenæus, and costly and extravagant luxuries were also a feature of Roman life under the Empire. Skill and resource in C. has been a strong point in the domestic life of the French ever since the middle ages; and it is not in high, elaborate, and expensive dishes that their *chefs* excel, but in the carefulness, economy, and resource of their *cuisine bourgeoise* they are equally deserving of praise and imitation. C. is an art that cannot be learned from any C.-book, however practical, and the recipes such books contain are seldom suited to the means of any but the comparatively wealthy. Every housekeeper should learn by experience as much as possible, and at least it is essential that she should be able to cook all plain everyday articles of food exquisitely, after which in a tentative manner she may essay more elaborate dishes.

Cookery, Army.—The preparation of the food of soldiers, while in garrison or during times of peace, is not necessarily different from cooking on the large scale for hospitals, prisons, or other public establishments. But for an army in campaign, the supply and proper preparation of food, seeing the soldier 'fights on his belly,' is at once of the highest importance, and often a question of much difficulty. The superintendence of the issue of rations, and the charge of their proper cooking, is confined to the medical department, but the men are themselves, as far as possible, instructed in the art of C., for which purpose a most complete school of C. is established at Aldershott. Several kinds of apparatus have been devised for baking and cooking food in the field, among which are Captain Warren's compressed steam-cooking pot, now in use in the British army, and in

Germany Beuerle's *Dampfkochtopf*, both based in principle on Papin's digester. Steam-baking ovens have also been used in the autumn manœuvres of the British army with satisfactory results. The introduction of tinned meats, and of compressed foods and meat extracts, has put within the reach of military authorities a convenient means of supplying healthy and suitable food during expeditions.

Cook'ia, a genus of plants of the natural order *Aurantiaceæ*, named in honour of Captain Cook. The fruit of *C. punctata*, the *wampee* of China and the Indian Archipelago, is greatly esteemed.

Cook, Mount, the highest mountain in New Zealand, is situated in the province of Canterbury, and forms the culminating point of the Southern Alps. Its height above the sea-level is 13,200 feet.

Cook's Inlet, a gulf on the N.W. coast of N. America, territory of Alaska, about 60 miles wide at its entrance, and penetrating 200 miles into the interior. It is named after Captain Cook, who explored it in 1778.

Cook's Islands, Cook's Archipelago, Mangaia Archipelago, and later **Harvey Islands**, a group of islands of coral formation in the S. Pacific Ocean, visited by Cook in his first voyage. The parallel 20° S. passes nearly through the centre of the group. The principal members of the group are Atiu, Harvey, Mangaia, and Rarotonga islands. Water is scarce (except in Rarotonga), and the inhabitants are obliged to rely in part on the milk of the cocoa-palm. Yet the soil is tolerably productive. The bread-fruit-tree and Pisang are particularly abundant. The inhabitants are Polynesian Malays, like those of the Society and Friendly Isles, and are skilled in various manufactures. They number about 10,000, most of whom have been converted to Christianity.

Cooks'town, a town in the county of Tyrone, Ireland, on the left bank of the Ballinderry, 14 miles N. of Dungannon. It consists of a single long broad street, crossed by a shorter one at right angles, and has a small trade in linen. Pop. (1871) 3624.

Cook Strait divides the N. and Middle Islands of New Zealand, and is 21 miles wide at its narrowest part. It is named after Captain Cook, who discovered it in 1770.

Coo'lies, or **Coulies**, from being originally the name of one of the hill-tribes of India, passed into use in that country as a generic term for porters, many of the tribe being employed in that capacity in the principal towns, in much the same way as the Gallegos in Spain. Subsequently the word has come to be generally employed to designate labourers sent from India and China to various tropical countries, the chief of which are Mauritius, the W. Indies, and portions of S. and Central America. A warm and prolonged controversy has prevailed on the subject of the exportation of C. On the one hand, it was alleged that the C. were subjected to much cruel treatment or neglect, and were slaves in fact though not in name. On the other hand, it was contended that they were much better off in the countries to which they emigrated than in their native lands—that they were treated with a reasonable amount of consideration, and were on the whole contented and prosperous. The truth probably is, that while grievous wrongs were at one time inflicted upon the coolie, he now improves his circumstances by emigration, at all events to British settlements. Mr Jenkins, M.P., writing in 1871 on the condition of the C. in British Guiana, spoke of the system as one which, 'spite of its disabilities, its difficulties, its present evils, is full of promise;' and he added, that in his belief it 'can be made, with care, skill, and honest endeavour, not only an organisation of labour as successful as any hitherto attempted, but one leading to almost colossal benefits' (*The Coolie, his Rights and Wrongs*, p. 367). The number of C. introduced into British Guiana from India in the season 1873-74 was 8299, besides 388 from China. The number of C. at present in the colony is about 55,000. In Dutch Guiana the employment of C. has not long been commenced, but in French Guiana it has existed since 1856, though the importation of C. was suspended for several years. The British Vice-consul at Cayenne reports that the C. there 'are very fairly treated by their French masters.' Most of them embrace the Roman Catholic religion, and many remain in the colony 'as free men, and become French citizens.' C. brought from Jamaica have recently been introduced into Colombia, and in Costa Rica the importation of Chinese C. commenced in 1873. E. Indian C. are employed in most of the British W. Indian Islands, as well as to a small extent in the islands belonging to France and Denmark. The Administrator of Trinidad, in his report for 1873, states that the total number of C. resident on estates in that colony at the end of the year was 20,892. Among the 4065 who arrived during the year, were a number who had formerly served in Trinidad under indenture, and who had returned thither from India, some of them paying their own passages.

Sir W. Grey, Governor of Jamaica, in his report for the year 1872-73, states the E. Indian population of the island at 12,455, of whom 5880 were serving under indenture, 1418 had served five years under indenture, but had not completed ten years' residence, and 5157, having completed ten years' residence, had voluntarily become colonists. Regarding the last class, the agent-general for immigration states that 'everywhere throughout the country the time-expired C. may be found in comparatively affluent circumstances.' The importation of Chinese C. into the W. Indies received a severe check in 1867, through the Chinese Government insisting on a return passage being granted at the end of five years, which was found to render the employment of Chinese C. unremunerative. A Chinese official visited Cuba in 1874 to arrange for the better treatment of Chinese C. employed in that island.

It is in Mauritius, however, that C. are most numerous. At the close of 1873 the population of the island was 331,782, of whom 215,000 were of Indian origin. Coolie immigration to Mauritius began in 1834, but was suspended in 1838. In January 1842 it was resumed, inquiry having shown that the immigrants were not grossly ill-treated, as had been alleged. In 1856 the outbreak of cholera caused another suspension of the immigration, which was resumed in April 1857. Due regard being now had to maintaining a balance of the sexes, the coolie population of Mauritius is increasing. In 1873, of the engaged labourers on estates, 5501, or about 8·40 per cent., were Indian creoles. The deposits in the savings-bank for Indians at the end of 1873 amounted to £107,916. The condition of the Indian population is spoken of by the officer administering the government as being 'fairly prosperous,' and as showing a marked improvement on some preceding years.

Steps are being taken to introduce Chinese C. into Cape Colony. In January 1876 an agent was despatched to China to make the necessary arrangements, the Colonial Government engaging to contribute £7 per head towards the expense.

A system of exportation of Chinese C., which was really nothing but kidnapping, was carried on for a number of years from Macao, until it was finally extinguished by the action of the British, Chinese, and Portuguese Governments in 1872-73. As showing what atrocities were perpetrated in carrying on this traffic, it may be mentioned that in twenty-three out of thirty-eight ships, the C. mutinied, and in thirteen they murdered every European on board. The C. themselves suffered still more heavily, as out of 3552 shipped on board seven vessels, 2449 perished from disease, fire, and shipwreck.

The importation of Polynesian natives into Queensland, to work on the sugar-estates there, has been carried on for some years, and the same practice has more recently been adopted in the Fiji group. The condition of these labourers is identical with that of C., but they are not known by that name. Stringent laws were enacted by the Imperial Parliament in 1868 and 1875 to prevent the trade in 'labour,' as it is called, from being abused, and a fleet of gunboats is employed in seeing that they are obeyed.

Coomass'ie, the capital of the kingdom of Ashanti, W. Africa, 130 miles N.N.W. of Cape Coast Castle. It was formerly walled, had wide streets, an extensive royal palace, furnished with a curiously miscellaneous collection of objects of value and interest, and a strong and vast fortress, named the Bantima. It was taken and burned by British troops under Sir Garnet Wolseley, February 1874, in the war against King Coffee Calcalli.

Coo'per, Sir Astley Paston, one of the greatest of British surgeons, was the son of the Rev. Samuel C., rector of Brooke, Norfolkshire, and was born at the rectory, 23d August 1768. He received his practical training under Mr Cline, and attended the anatomical lectures of John Hunter. He soon became a

great authority in anatomy and surgery, and filled in succession the posts of Professor of Anatomy in Surgeons' Hall (1792), and surgeon to Guy's Hospital (1800). In 1804-7, C. published his celebrated work on *Hernia*. His private practice rapidly increased, and in 1813, in which year he received the Professorship of Comparative Anatomy in the College of Surgeons, his income reached the sum of £21,000. A skilful and daring experimenter, he attempted (1817), although unsuccessfully, the tying of the carotid artery and of the aorta. In 1820 C., who had removed a steatomatous tumour from the head of George IV., was made a baronet, and till his death, which took place 12th February 1841, honours poured in upon him. He filled, besides other posts, those of President of the College of Surgeons (1827), and Vice-President of the Royal Society (1830), while he was made a D C. L. of Oxford, an LL. D. of Edinburgh, and a member of the French Institute. His writings, in spite of his busy life, were numerous, and many of them, especially his treatise on the *Anatomy and Diseases of the Breast* (1829-40), may be said to have revolutionised the theories on the subjects of which they treat. The school of Hunter was fertile in great surgeons, but none has surpassed, if any has equalled, the brilliant and original C. See *The Life of Sir Astley C.* (2 vols. Lond. 1842) by B. Cooper.

Cooper, James Fenimore, one of the most popular of American novelists, was born at Burlington, New Jersey, U.S., September 15, 1789 Educated first privately, and afterwards at Yale College, he entered the navy at the age of thirteen as a midshipman, and served in it for six years. Returning into private life, he married, and after some years of solitude he took the reading public of the United States by storm with his novel of *The Spy* (1822). This was followed by a large number of other fictions, all like it marked by strong nationality and great powers both of narration and description. The chief are *The Pioneers* (1822), *The Pilot* (1823), *Lionel Lincoln* (1824), *The Prairie* (1825), *The Last of the Mohicans* (1826), *The Red Rover*, and the *Waterwitch* (1828). Some of these, such as *The Pilot* and *The Last of the Mohicans*, were at least as much admired in Europe as in America; but while C. is still much read, especially by boys, he does not stand on the pedestal on which he was placed by his earlier admirers. C. visited England in 1827, and published some sketches of European society. He died at Cooperstown, New York, 14th September 1851. C.'s daughter, **Susan Fenimore C.**, born 1815, is an authoress of some mark. Her books are chiefly descriptive of country life. The chief are *Rural Hours* (1850), *Country Rambles, &c.* (1852), and *Rhyme and Reason of Country Life* (1854).

Cooper, Peter, an American philanthropist, was born in New York, February 12, 1791. About 1828 he engaged in the business of glue and isinglass, and in 1845 he erected large mills in Trenton for iron-rolling. The fortune which C. acquired in business he has liberally used for the public good. Feeling a deep interest in the welfare of the working classes, he erected the *C.' Institute* in a central part of New York city. It cost £100,000, and this building, with all its profits and rents, is devoted to the education of the people. It includes a free reading-room, school of design, galleries of art, and evening classes. C. is still (1876) alive.

Coo'perage, the art of making barrels, casks, and other vessels of wooden staves and headings, banded with hoops. The art early reached a state of perfection, for Pliny states that such vessels were used for storing wine. Although of late years a large number of ingenious machines have been contrived for the production of casks, &c., and are employed in a few establishments, yet the C. industry is practically carried on manually. The manufacture of *tight* or *wet* casks for holding liquids is the most important branch of C. The operations of the cooper consist in shaving and planing the Dantzig oak staves to the proper curve, both in the direction of the length and breadth, in shaping them so as to be broadest and bulging at the middle, and gradually tapering to the ends, in bevelling the edges and ends, and in 'chining' the grooves to receive the heads. The staves are then brought together and bound with slightly coned iron hoops, the heads, bevel-edged and slightly ovalled, are driven into the grooves, and the bung-hole bored.

Co-opera'tion. This term has come to be specially applied to an extension of the principles of joint-stock enterprise which has taken place of recent years. (See JOINT-STOCK COMPANY.) Societies are formed, whose members subscribe a capital with which to work some commercial concern, of a kind formerly left to individual enterprise; the object being to share the profit among the members, without any expenditure of time and thought by the general body of them. There are, of course, co-operative societies whose object does not come within the above definition. (See BENEFIT OR FRIENDLY SOCIETIES, BUILDING SOCIETIES.) In this article consideration is restricted to the scope of societies whose design is as above stated. That many of these have been eminently successful, and many very much the reverse, is a fact perhaps to some extent to be accounted for by causes which affect co-operative and individual enterprise alike; but it is probable that the main cause of the difference of result is to be found in the different nature of the undertakings. Where a business requires special skill and energy to make it succeed, C. will fail. Any one, conscious of possessing the necessary gifts, will rather exercise them for his own advantage than for the advantage of a society; and it is vain to expect that a number of men, having no special ability, can by C. compete successfully in a business which requires that, with an individual who has it. Then suppose, by good luck, that the right man is secured to conduct the affair, he is but, so to speak, the president of a republic liable to have his plans checked and thwarted by timidity of shareholders, and by the ignorance and consequent self-conceit of directors. The individual trader, again, is in his business an autocrat, and acts with the force of one. Can any one suppose that such a business as that of the late Mr Brassey could have been successfully conducted by a co-operative society, even had Mr Brassey been the manager of it? When the business chosen has been such as any man of average ability who has served an apprenticeship to it may conduct, C. has been generally successful. Besides supporting about five hundred officials, the profits of the *Civil Service Supply Association* of London have been enormous. In Edinburgh, on a humbler scale, the similar institution—the *Professional and Civil Service Supply Association*—continues to be very prosperous. By its accounts for the half-year ending 29th February 1876, the profit for the half-year is shown to be £418, 10s. 5d., while the salaries and wages paid—in a sense *profit*—are £1054, 17s. 8d., and the number of members has increased from 1777 to 2101. Such institutions clearly ought to succeed—competent managers and sub-officials being easily got. By the ready-money system on which they are conducted, the honest are not taxed on account of the dishonest. Providing their own customers, they are not obliged to increase the price of articles to pay advertising. Some endeavours have been made of recent years by members of Trades Unions (q. v.), as opposed to capitalists, to carry on co-operative productive trading. These have not been successful, nor does it seem as if they ever could be, owing to the antagonism of the positions. The aim of trade-unionism is to force up the rate of wages; the success of C., as applied to production, depends on keeping the rate of wages low. As co-operators the workmen are their own employers, and experience has shown that workmen prefer immediate to postponed enjoyment—high wages to profits.

Co-or'dinates, the name of the directed quantities which determine the position of a point, and which constitute the great peculiarity of Descartes' method of analytical geometry. The position of a point in space requires for its determination three numbers, one of which, at least, must be a rectilinear measure. Thus, the summit of a mountain is fixed, if we know the number of points of the compass which it is E. or W. of N., the angle of elevation, and its direct distance from us; or if we know how far it is N., E. (or W.), and its vertical height. This latter is a case of the method in question, these distances being the C. of the summit. It is obvious, however, that it is requisite beforehand to fix three arbitrary directions, which need not be at right angles to each other, but which are usually so taken for convenience. Take then in the plane of the paper the two lines OX, OY, to represent two of these directions, and suppose OZ not in the plane of the paper to be the third. These lines are called the *axes*. Take now *any* point P, whose position is to be determined with respect to these three directions. Through P draw PN parallel to OY, and meeting the plane containing OX and OZ in N. Through N draw NM parallel to OZ, and meeting OX in M. MO, PN, NM, are the C.

of the point P with respect to the three axes of X, Y, and Z; and are expressed respectively as x, y, and z. If the axes be mutually rectangular, the C. are so also, and therefore

$$x^2 + y^2 + z^2 = ON^2 + PN^2 = OP^2.$$

If P lie on the surface of a sphere, whose centre is at O, OP is constant $= a$ suppose. Hence $x^2 + y^2 + z^2 = a^2$ represents any point on the sphere, and is, therefore, called the *equation* of the sphere. If $z = 0$, the equation becomes $x^2 + y^2 = a^2$, representing a circle of radius a, centre O, in the plane xy. For any value of y, x has two equal values, one positive, the other negative; and thus the signs + and − undergo an important extension of meaning, representing not merely addition and subtraction, but *direction*. In *plane* analytical geometry only two axes are required, and y and x are known respectively as the *ordinate* and *abscissa* (Lat. 'cut off'). See GEOMETRY, ANALYTICAL.

The method of *Polar C.* has been already hinted at. By it a point is fixed by the length and the *Direction-Cosines* (q. v.) of its radius vector. Its most practical use is in the planetary theory.

Lagrange's *Generalised C.* deserve a word of notice. The C. represent the degrees of freedom possessed by the system whose motion is under consideration, and are wholly determined in each special case by the conditions of the problem. For each co-ordinate there is an equation of motion, and hence there are as many equations as there are C. The combination and integration of these, when possible, give the complete motion of the system. See De Morgan's *Calculus*, and Thomson and Tait's *Natural Philosophy*, vol. i.

Coorg, or **Curg**, a province under the government of India, bounded by Mysore, Malabar, and Canara, with an area of 2000 sq. miles, and a pop. in 1872 of 168,312. Till 1834 it was a native principality. It is now subdivided into fourteen executive districts. The country is hilly and rugged, and is clothed with forests, which in some places abound with sandal and other valuable kinds of wood. Elephants, tigers, and many varieties of birds and reptiles are among the fauna. Where the land is fertile it is generally well cultivated, and produces rice in abundance. A system of fortifications, having an aggregate length of 500 miles, and consisting of a rampart and ditch, evidently very ancient, presents a most interesting problem to the historical antiquary.

Coo'sy, a river of Hindustan, which has its source on the southern slope of the Himalayas, and after a course of 325 miles nearly due S., through Nepaul and Purneah, falls into the Ganges, about midway between Patna and Moorshedabad.

Coot (*Fulica*), a genus of Grallatorial birds, included in the family *Rallidæ* or Rails. The toes in the C. are fringed with broad membranous lobes, somewhat similar to those of the Grebes (q. v.). The C. is sometimes placed more intimately in the family of the *Gallinulinæ* or waterhens. The common C. (*Fulica atra*) occurs in Europe, N. Africa, and Asia. It is coloured black; the wings have a white bar, and the forehead is also white. It averages from 13 to 16 inches in length, and has a strong, conical, straight bill. The C. flies southwards in winter. The American C. (*F. Americana*) occurs in N. America.

Coote'hill, a town in Cavan county, Ulster, Ireland, on the river Coragh, 12 miles E.N.E. of Cavan, has a considerable trade in linen. Pop. (1871) 1851.

Copai'va, or **Copai'ba**, often improperly called *balsam of C.*, is obtained from incisions made in the trunk of *Copaifera multijuga* and other species of Copaifera, trees belonging to the *Leguminosæ*, sub-order *Cæsalpiniæ*, and found chiefly in the valley of the Amazon. It consists of a resin and oil; the latter is used in medicine. C. somewhat resembles olive oil, has a peculiar odour, and an acrid taste. It exudes so abundantly after an incision has been made in the tree, that as much as 12 lbs. is sometimes collected in a few hours. C. is a diuretic and cathartic, and is useful in cases of bronchitis and mucous discharges.

Co'pal, a resinous substance extensively employed in the arts. It is the general Mexican name for resins or gums. Mexican C. is, however, now derived from a species of *Hymenæa*, a leguminous tree. *Copaifera Guibourtiana* or *Guibourtia copallifera* is the source of most of the recent W. African C., though a great portion of the C. sent from that part of the world is fossil-resin, produced, according to the late Dr Welwitsch, by trees which are now extinct or only exist in a dwarfed condition. *Trachylobium mossambicense* has been shown by Dr Kirk to be the source of Zanzibar C. The valuable *Animé C.* of the same island is, however, semi-fossil, and was probably derived from the same species of tree, then existing in forests now extinct. The exact source of Brazilian and Angola C. is not known. The so-called Indian C. is the produce of *Vateria Indica*. C. is also obtained from Madagascar, where it is believed to be the produce of *Hymenæa verrucosa*. All are extensively used in making varnishes, lacquer, &c.

Copal'chi Bark, the bark of *Croton pseudo-china* or *niveum*, a Euphorbiaceous plant, a native of the W. Indies and Mexico. It is used as a tonic.

Copalm Balsam, or **Copalme d'Amerique** (Fr.). See LIQUIDAMBAR.

Copan', a ruined city of Honduras, on the borders of Guatemala, Central America, on a river of the same name, an affluent of the Motagua. The ruins, which extend for 2 miles along the banks of the C., and are about 1500 in number, include the remains of a temple 624 feet long, pyramidal structures, and monoliths, with sculptures and hieroglyphs identical with those of Palengue.

Copar'cenery. In England, when an estate of inheritance descends from the ancestor to two or more females, it is said to be an estate in C., and those to whom it descends are coparceners. Each is entitled to her distinct share, though the property remains undivided, and no benefit accrues on survivorship, the right of each descending to heirs. C. does also sometimes occur among males. See GAVELKIND; COMMON, TENANCY IN; COMMON PROPERTY.

Copart'nery. See PARTNERSHIP.

Cope (from the same root as *cap* and *cape*), a semicircular vestment worn during divine service by Roman Catholic priests, reaching from the shoulders nearly to the feet, and open in front, except at the top, where it is fastened by a band, clasp, or morse. This choir, or canonical C., was, prior to the 14th c., distinguished from the *cappa fluvialis*, a large mantle with a pointed hood to it, which was worn out of doors, but which was subsequently disused. In the 12th c. a custom arose of putting sleeves to the C., but Pope Innocent III., in the fourth Lateran Council, forbade these *cappæ manicatæ*.

Cope, Sir John, an English commander, who has obtained an unenviable immortality through his surprise and defeat at Prestonpans by Prince Charles Stuart, 21st September 1745. A clever song in which the defeat is celebrated survives to this day. C.'s 'raw dragoons' were wretched material to oppose to half-savage Highlanders in the first flush of their triumphant march from the N., and C. has perhaps been too severely judged. He died Knight of the Bath and a lieutenant-general, 28th July 1760.

Co'pec, a Russian copper coin, the hundredth part of a silver rouble, or three-eighths of a penny sterling. The C. was at first coined of silver. The name is connected with the Russian word for a lance, the C. having anciently borne the effigy of St George.

Copenha'gen (Dan. *Kjöbenhavn*, *i.e.*, 'merchant's haven'), the capital of Denmark, partly on the island of Seel (Dan. *Sjælland*) and partly on the island of Amak or Amager, in the Sound, and situated so low that it has to be defended by embankments against inundation. It is divided into three parts—the Old Town, or W. part; the New Town, or E. part; and Christianshavn on Amak, connected with C. proper by the bridges Langebro and Knippelsbro. The channel between the islands

forms a splendid harbour. The estimated pop. for 1875 was 216,000. C. has suffered frequently from fire, the old houses having been for the most part constructed of wood. These have, however, been replaced by structures of brick or Norwegian granite. The city contains numerous squares, of which the finest is Kongens Nyton (the new King's Market). It is central, and is adorned with a colossal leaden statue of Christian V., as the octagonal Frederik's Place is with an equestrian statute of Frederik V. The fortifications, once strong, have, with the exception of the citadel, *Frederikshavn*, been dismantled. The most notable structures are the Frue Kirke (Church of our Lady), the metropolitan church of the kingdom, which suffered during the bombardment of 1807, but has been restored, and contains some of the masterpieces of Thorwaldsen; the Trinitatis Kirke, founded by Christian IV., with a curious round tower; Holmens Kirke, with monuments to the naval heroes Juel and Tordenjold; the palace of Christiansborg, of vast extent, with decorations by Thorwaldsen; and the castle of Rosenborg, designed by Inigo Jones, and in which the regalia are kept. C. is rich in museums of antiquities, natural history, numismatics, &c. That of northern antiquities is peculiarly interesting. It occupies a wing of the palace of Christiansborg, and contains a collection of stone and bronze implements, ranging from the rudest prehistoric times to 500 A.D., also of articles in gold and silver to 1000 A.D., and specimens of Scandinavian art and manufacture to the present time. The Royal Museum of Natural History is rich in zoological and mineralogical specimens. Thorwaldsen's museum, opened in 1846, contains the bequest made by him to the nation of his own works and numerous collections. The university, founded in 1478 by Christian I., but whose constitution was remodelled in 1788, has had among its professors men of European reputation in their several departments. It is well endowed, has about forty professors and 1000 students, a library of 200,000 volumes and 4000 MSS., among which are rich collections in Old Persian, Old Indian, and Old Norse. The royal library, founded by Christian III., contains 500,000 volumes and 20,000 MSS., among which are Rask's Sanskrit collection. The manufactures, which are trifling, and chiefly for home consumption, consist of woollens, linen, sailcloth, leather, and porcelain; but C. is still the centre of all the foreign commerce of Denmark, and in 1874 possessed a merchant navy of 398 vessels, with a tonnage of 63,118. It has railway communication with Korsör and Helsingor; regular steam communication with Kiel, Lübeck, Stettin, Norway, Sweden, Russia, France, England, and America. About the middle of the 12th c. C. was a small fishing-village, in whose neighbourhood Bishop Axel (q. v.) or Absalon built a fortress called Axelhuus, to repress the piracy of the Baltic. In 1254 the village, which Saxo Grammaticus (q. v.) calls *Urbs Absalonica*, then *Portus Mercatorum* and *Castrum de Hafnia*, received municipal privileges, and in 1443 it became the capital of the kingdom. It has suffered much from sieges and bombardments, but its most grievous disaster was its bombardment by the British fleet, September 2–5, 1807. The environs of C. are extremely beautiful. See E. J. Jonas, *K. und Umgebungen* (4th ed. Berl. 1874).

Coper'nican System, The, is that system which represents the sun as being in the centre of the solar system, and the planets, of which the earth is one, as revolving round it. It is so called after Copernicus (q. v.), who advocated it in his work *De Revolutionibus Orbium*, but who, it must be observed, was not the first founder of it, that merit being due to Pythagoras (q. v.). The Newtonian system must be carefully distinguished from this, however, which Copernicus merely brought forward as a hypothesis, and tried to establish by much false logic and erroneous conceptions. He imagined the universe to be a sphere, in the centre of which the sun was immovably fixed. Round this central fire the planets revolved in circles, the proof of this being the famous Aristotelian dogma that circular motion was perfect. But this failed to agree with observation, and accordingly Copernicus was compelled to follow the same course as Ptolemy by introducing into his sytem complex epicycles. Many of the arguments which he used for establishing his hypothesis could have been easily turned against him by an intelligent advocate of the Ptolemaic system. Notwithstanding such defects, the *De Revolutionibus* produced a powerful effect, and prepared the way for the discoveries of Galileo, Kepler, and Newton. It is especially valuable for the generally correct explanation of some till then mysterious astronomical phenomena, *e.g.*, the variations of the seasons, the precession of the equinoxes, and the stationary and retrogressive motions of the planets.

Coperni'cia. See CARNAHUBA PALM.

Coper'nicus (the Latinised form of *Koppernigk*), **Nikolaus**, a famous astronomer, was born 19th February 1473, at Thorn, in Prussia. After studying medicine, philosophy, and mathematics, especially the last, in the University of Cracow, he proceeded to Rome in 1496, where he met with the celebrated Regiomontanus, and where, in 1499, he became Professor of Mathematics. On his return to Prussia, he entered holy orders, became a canon at Frauenburg in 1502, and occupied the remainder of his life in his ecclesiastical duties, in giving gratuitous medical advice, and in prosecuting his favourite sciences of astronomy and mathematics. The results of his observations led him to reject the Ptolemaic system of the universe, and to propose the one which goes by his name. (See COPERNICAN SYSTEM.) It was with this end in view that he prepared his great work, *De Orbium Cœlestium Revolutionibus*, Libri vi., which was published at Nürnberg in 1543, a few days, it is said, before his death (May 24). C. also wrote a work *De Lateribus et Angulis Triangulorum* (1522), several letters on general subjects, and a treatise on money. The first biography of C., that of Gassendi (1654), of which an English translation is given in Martin's *Biographia Philosophia*, formed for 200 years the groundwork of all other biographies. It is only in quite recent times that researches in archives have enabled us to obtain a clearer conception of C. and his work. See Prowe's *Zur Biographie des K.* (Thorn, 1852); and *Über das Verhältniss des K. zu Herzog Albrecht von Preussen* (Thorn, 1855); *De Patria Copernici* (Thorn, 1860); and *Über die Abhängigkeit des K. von den Gedanken Griech. Philosophen und Astronomen* (Thorn, 1865).

Copiapo', a name applied in Chili, S. America, to a river, a village, a city, and a district. 1. The *river* rises in the Andes, flows in a N. and W. direction, and after a course of 120 miles falls into the Pacific. 2. The *village*, Porto de C., at the mouth of the river, has parted with much of its trade to the flourishing seaport of Caldera. 3. The *city*, capital of the province of Atacama, lies about 30 miles up the river from the sea, and on the railway between Caldera and the mining centre of Juan Godoy. It exports the mineral wealth of the district. In 1873 the value of its exports amounted to 5,429,766 dollars, and of its imports to 6,315,180. Pop. (1875) 11,432. 4. The *district* is rich in silver, copper, and cobalt. It is projected to carry the railway in C. across the Andes and connect it with the Argentine lines.

Co'ping, in building, the capping or covering course of a wall, which may be flat, or it may be sloping or round, to throw water off. The term *cops* is sometimes applied to the Merlons (q. v.), or rising parts of battlements.

Cop'land, James, an English physician and author, was born at Deerness, in the Orkneys, in 1792, studied at Edinburgh, and, after travelling in Africa to study epidemic diseases, settled in London in 1820. He died July 12, 1870. C.'s works, including his *Outlines of Pathology*, his *Elements of Physiology*, his essay on *Pestilential Cholera*, and above all his *Dictionary of Practical Medicine* (1830–58), enjoy a very high reputation both at home and abroad.

Cop'ley, John Singleton, a historical painter, of Irish extraction, was born at Boston, America, 1737, came to England in 1774, was elected R.A. in 1783, and died 1815. His best works are the *Death of Lord Chatham*, in the national collection, and the *Death of Major Pierson*, which was the property of his son, the late Lord Lyndhurst (q. v.).

Copp'er is an important and widely distributed metal, and has been known from early ages. At one period it was employed in the manufacture of articles and implements now made of iron (see BRONZE AGE)—a fact which is accounted for by the occurrence of C. in the native or uncombined condition, or in ores which yield the metal by very simple processes. C. was called by the ancients *æs* or *chalchos*, its modern title of C. (Lat. *Cuprum*) being derived from Cyprus, an island in which formerly C. was smelted by the Greeks and Romans. C. is found in various minerals, the most important of which are *C. pyrites* (Cu_2S, Fe_2S_3); *C. glance* (native sulphide of C.), (Cu_2S); *malachite*, a basic carbonate of C. ($CuCO_3CuH_2O_2$); also *red C. ore* (the red oxide of

C.), (Cu_2O), and black oxide of C. (CuO). Native C. occurs crystallised or in veins. There is a vein of C. in the neighbourhood of Lake Superior in N. America, which in some places is almost two feet thick. More than one-half of the total C. annually extracted is smelted in Great Britain, and of this about one-third comes from the Cornish mines. The ores raised in Cornwall consist for the greater part of C. pyrites. Owing to the absence of coal from the neighbourhood, they are transported to S. Wales, where that mineral is abundant. The operations of C.-smelting, as practised at Swansea and in the neighbourhood (the seat of C. industry), are complex, though their principle is simple. The ores after sorting are roasted on the bed of a reverberatory furnace. Here much of the sulphur is burnt off as sulphurous acid, and arsenic (also frequently present in the ore) volatilises. The iron by this treatment is converted into ferric oxide (Fe_2O_3), which subsequently becomes changed to ferrous oxide (FeO) by the reducing gases of the furnace. The ferrous oxide then unites with silica, originally present in the ore, or which has been added to it in the form of sand for the purpose, and forms a fusible slag, whilst a tolerably pure sulphide of C. remains (*coarse metal*). The fused sulphide of C. is drawn off from the slag and again roasted, when it loses the whole of its sulphur as sulphurous acid (SO_2), and metallic C. remains. C. possesses a peculiar red colour and a bright lustre. It is malleable, ductile, and remarkably soft—a property which enables it to be hammered into various forms at ordinary temperatures. It fuses at a white heat, and at a very high temperature volatilises as a green vapour. In dry air C. remains unchanged, but in presence of moisture and carbonic acid, it becomes covered with a coat of basic carbonate. Heated in the air, its surface becomes covered with a film of black oxide of C. (CuO). C. is soluble with effervescence in nitric acid, nitrate of C., $Cu(NO_3)_2$, remaining in solution, and nitric oxide, NO, escaping as a gas. Other acids do not act upon it at ordinary temperatures. C. forms two series of compounds called *cupric* and *cuprious;* these contain respectively one and two atoms of C. united to the same amount of acid or electro-negative radical. Thus cupric sulphate has the formula $CuSO_4$, cuprous sulphate Cu_2SO_4. The cupric salts are the most important. Cupric sulphate, $CuSO_4,5H_2O$, is used by the calico printer, and is called *blue vitriol;* it has also been employed as a cure for the *smut* in wheat, and in medicine as a caustic. Cupric oxychloric, $CuCl_2,3CuO,4H_2O$, known in the arts as *Brunswick green*, is employed as a pigment. *Scheele's green* is a cupric arsenite; *verdigris*, a basic cupric acetate. C. is largely employed in the arts, both in the pure state and alloyed with other metals. (See ALLOYS.) Its salts are sometimes employed in medicine, and are poisonous. Small quantities of C. appear to be normal constituents of certain organs—the kidneys being one of them. The atomic weight of C. is 63·4, and the symbol for its atom Cu.

Copp'eras is the sulphate of iron or ferrous sulphate ($FeSO_4$ $7H_2O$). See IRON.

Copp'ering, in shipbuilding, a term applied to the process of sheathing the bottoms and sides of wooden vessels with copper or an alloy, to protect them from the ravages of sea-worms, and to prevent, by the slow oxidation of the metal, the accumulation of vegetable and animal growths, which, from their abundance, materially impede the progress of ships. Muntz's patent sheathing is composed of sixty parts of copper and forty parts of zinc. 'Protective' and 'anti-fouling' compositions are now commonly applied to ships' bottoms, but their protective power, except in two or three cases, is very indifferent, and a really good and cheap composition is still a desideratum.

Copp'ermine River, in the N. of the old Hudson's Bay territory, Dominion of Canada, rises in a small lake to the S. of Great Bear Lake, flows N.E. for about 110 miles to Point Lake, after leaving which it takes a northerly direction, entering Coronation Bay at Bloody Fall, after an entire course of some 300 miles. It has only one tributary of any size, and is rendered impassable by its numerous falls and rapids. The C., along with the Indians on its banks and a mountain range to the W., receives its name from the presence of *copper* in the district, and was discovered by Lieutenant Hearne in 1771.

Copp'erplate Printing. See ENGRAVING.

Cop'rolites, the name given to certain fossilised substances, presumed to represent the petrified excrements of fishes, reptiles, &c., and which occur in Mesozoic and Tertiary deposits. These C. frequently present perfect casts of the interior of the intestine, and the section may show the remains of scales, teeth, shells, &c., which have resisted the digestive processes. C. are chiefly composed of phosphate of lime, and are therefore valuable as affording a capital manure for the agriculturist. In the chalk system, for example, beds of phosphatic concretions are met with of coprolitic origin. The names 'fossil cones,' 'bezoar stones,' &c., were applied to C. in ignorance of their true nature.

Copros'ma, a genus of shrubs belonging to the natural order *Cinchonaceæ*, deriving their name from their very fetid odours. The leaves of *C. fœtidissima* are used in divining the will of the gods by the New Zealand (Maori) priests. See Bennett's *Gatherings of a Naturalist in Australasia.*

Cop'tis, or **Gold Thread**, a genus of plants of the natural order *Ranunculaceæ*, consisting of a few species found in America, N.E. Asia, and one in Russia. In America the long thread-like underground stems of *C. trifoliata* are used as a tonic and material from which a yellow dye is extracted.

Copts (from *Coptos* in Upper Egypt) are a sect in Egypt professing a corrupt form of Christianity, who are the direct descendants of the Monophysites (q. v.) in Egypt, who seceded from the Catholic Church when their tenets were condemned by the Council of Chalcedon (451). The Arabian conquest rendered the schism irrevocable, and thus the Coptic Church was constituted. The C., however, are much more than the relic of a Christian sect; they are the only living representatives of the ancient Egyptians. In numbers they do not exceed 200,000, but have thirteen bishops, and a patriarch (of Alexandria, who, however, resides at Cairo). They have two versions of the Holy Scriptures—the Memphitic, in the Coptic dialect of Lower Egypt, and the Thebaic, in that of Upper Egypt. The Scriptures are still read from these in their public worship, but as the language is not now understood either by people or priests, they are afterwards explained in the Arabic, which is their vernacular. An intimate relation is kept up between the C. and the Abyssinian Church, the Patriarch of which is always nominated by the Patriarch of the former. See Stanley's *Eastern Church*, and Carl Abel's valuable *Koptische Untersuchungen* (Parts i.-xi., Berl. 1877).

Cop'ula (Lat. 'band'), the logical term for the word which joins the subject and predicate of a proposition—*e.g.*, 'Cæsar is dead.' Here Cæsar is the subject, dead the predicate, and *is* the C. The sign of predication may also be made by an alteration, called an *inflection*, on the predicate—*e.g.*, 'water flows'—*i.e.*, *is* flowing. For the confusion to which a dim conception of the nature of the C. has given rise, see Mill's *Logic*, book i. ch. 4.

Cop'y (Fr. *copie*, Lat. *copia*, 'plenty,' Low Lat. 'a pattern or transcript,' because it could be 'frequently' repeated), in art, a work in painting, sculpture, or engraving, reproduced by one artist from the original design of another. A reproduction of a work of art, executed by the artist himself, is called a *duplicate* or *replica;* a reproduction in plaster of a work of sculpture is called a Cast (q. v.).

Cop'yhold, in England, is that right of tenure of land constituted by copy of the roll of the tenants of the lord of the manor. Copyholders were anciently nothing more than villeins, who by gradual encroachment at last established a customary right to their estates, previously held absolutely at the will of the lord of the manor. No right of C. can now be created, for it is requisite to the tenure that it have been held from immemorial time in virtue of copy of court roll. In Ireland there are no lands of C. tenure, but in England it is by it that much of the land continues to be held, under relaxation of its more onerous ties and conditions. Services anciently due from them having mostly fallen into desuetude, a C. estate has become nearly equal in value to a freehold. Subsisting manorial rights may be commuted, and copyholds enfranchised under provisions of 4 and 5 Vict. c. 35, amended by subsequent statutes. The tenant or lord of the C. land may compel its enfranchisement, and the extinction of a claim of Heriots (q. v.). When either lord or tenant requires an enfranchisement, notice is to be given, and unless the sum be agreed upon, the amount is to be ascertained under direction of the C. Commissioners, whose award is to have equal force with a deed of enfranchisement under the C. Acts.

An ordinary conveyance is ineffectual with regard to C. land. The mode of transference is symbolical, like that called Resignation (q. v.) in Scotland. The land is symbolically surrendered to the lord of the manor or his steward, who again, in the same way, transfers it to the person to whom the transfer is to be made, and on the desired conditions. See CONVEYANCING.

Copying Machines, a term applied in a restricted sense to machines for producing facsimiles of various writings. In general the copying machine consists of a heavy metal frame fixed to or standing upon a table, and having above it a flat plate of the same size, which can be raised up and pressed down by means of a screw. In connection with the machine, a book full of blank tissue paper is used. A page of this is damped, the letter to be copied inserted underneath it, and the whole placed between the plates of the press. The movable plate is forcibly screwed down upon the fixed one, and by the pressure an exact copy of the letter is impressed upon the damped page. This copy is, of course, reversed, but the paper is so thin that it can be read through the right way without difficulty. Specially thickened ink, called 'copying ink,' must be used in writing the letter in the first instance.

Copying, in photography, is the name given to that branch of the art which deals with the reproduction of pictures, engravings, maps, manuscripts, &c. In employing the camera for C. it is necessary, in order to avoid having a distorted image, to place the instrument in a perfectly horizontal position with the front parallel to the picture. A good diffused light should surround the picture, which should be unglazed and reversed. To secure an image with well-defined edges, a lens provided with a small diaphragm should be used. Engravings with half-tints are not adapted for successful reproduction. To produce a negative with perfect transparency in the shadows, an old collodion, mixed, if necessary, with a little dilute tincture of iodine, that adheres well to the glass, should be selected, and the nitrate bath should be of full strength. A good negative is distinguished by clear delineation of the lights and shades, with great density in the opaque parts. In printing the positives a highly-salted paper will yield good results, free from the gloss which accompanies the use of albumen, and increased intensity and brilliancy will follow the employment of an extra strong 'silver' bath. For rich purple toning, a bath of 30 grains acetate of soda, 5 grains carbonate of soda, and 10 oz. water should be prepared twelve hours beforehand, and just before using add 3 grains chloride of gold in 2 oz. water. The bath works quickly when hot, and slowly when cold.

Copyright, Law of. The intangibility of literary property makes the framing and administration of laws for its protection peculiarly difficult. Admitting that no one is entitled to sell the book or copy the picture of another without his consent, there still remains the difficulty of determining whether or not one book is essentially the same as another, or whether or not one picture is essentially copied from another. Then questions arise as to the reasonable duration of C. of an author or his heirs, and respecting the rights of others to translate or abridge works.

The L. of C. over the United Kingdom rests partly on common law and partly on statute. Under the former it has been decided in England that a *bona fide* abridgment of a book is a new work, and however it may injure the sale of the original, that it does not violate C.; and in the case of Kearsley *v.* Carey, Lord Ellenborough held that a variance in form and manner was a variance in substance. But in all abridgments, histories, chronologies, dictionaries, and the like, it must be left to a jury to determine whether a publication complained of is a *servile* copy and *imitation*, meant to supersede another, or an original work on the same subject. No one but the author or his assignee has the right to print or publish *original* notes or additions to an old work, though there be no C. in the main work (Carey *v.* Longman, 1 E. R. 358). All translations are C.

An alien author may obtain a British C. by *first* publishing his work in England. This was so decided by Lord Chief-Justice Campbell (Boosey *v.* Jeffrey), who thereby reversed the previous L. of C. as declared by the superior courts in the case of Boosey *v.* Purday.

It has been decided by the House of Lords (Jeffrey *v.* Boosey) that a foreigner has C. in a work composed and published in England, though he has only been resident in England for a day. C. has been considered by the common law as a right vested in an author or artist. But the duration, modification, and mode of assignment of the right are now regulated by the statute 5 and 6 Vict. c. 45. After the passing of the Act, July 1, 1842, it is provided that in every book published in the lifetime of the author, he and his assignee shall have C. for the term of the author's life, and for seven years after his death; or, if these seven years expire before the end of forty-two years from the date of publication, then for forty-two years. Thus, for any book published since the Act took effect, the C. subsists either for forty-two years certain, or during the author's life, and seven years after his death.

Regarding books published before the Act came into force, and of which the C. then existed, provisions are made by which the benefits of the Act may be secured by the author or his personal representative, or by the proprietor of the C. The C. of a book published after the death of the author is to last for forty-two years from the time of publication, and to belong to the proprietor of the manuscript from which it is first published and his assignee. To prevent the suppression of any book of importance, the judicial committee of the Privy Council may, on complaint, license a work to be republished, on such conditions as it may think proper.

The C. in articles in encyclopædias, reviews, magazines, and in periodicals and serial works, is vested in the proprietors who shall have *employed* and *paid* persons to write them; but the right to republish articles published first in periodical works reverts to the author after twenty-eight years, to continue for the remainder of the term given by the Act. During the twenty-eight years the publisher of the periodical has not the right to publish the article separately, without the consent of the author or of his assignee.

A perfect copy of the whole of every book, and of every subsequent edition, with additions or alterations, is to be delivered within one calendar month after publication to the British Museum, and within a month of demand to the officer of the Stationers' Company for the following libraries: the Bodleian, the public Library of Cambridge, the Advocates' Library of Edinburgh, and that of Trinity College, Dublin, or the publishers may send the copies direct to these libraries. Non-compliance with this provision renders the party liable to a penalty of £5.

A book of registry is to be kept at Stationers' Hall; the book to be open to the inspection of all, on payment of one shilling for every entry which shall be searched for or inspected, and a certificate of the same is to be given by the clerk, when required, on payment of five shillings; this certificate to be received in all courts as *prima facie* proof of the proprietorship or C. of the work. No one except the proprietor of the C. is allowed to import into the British dominions any copy of the work reprinted abroad, under the penalty of £10, and double the value of every copy imported. C. is declared to be personal property and capable of bequest. The Act extends to every part of the British dominions.

International Copyright.—By 7 and 8 Vict. c. 12, the Queen is empowered by Order in Council to direct that authors, inventors, &c., shall have the protection of the former Act within the British dominions. In accordance with this statute, treaties of international C. have now been carried out between the United Kingdom and France, Prussia, Belgium, Saxony, and Sardinia. There is no treaty of C. between England and the U.S. of America.

Copyright in Lectures, Letters, and the Drama.—The author or assignee of any lecture has the sole right of delivery, printing or publishing it. Printers or publishers of newspapers publishing lectures without leave are subject to penalties; but the Act does not extend to lectures delivered at colleges or schools. A letter is the property of him to whom it is sent, but he is not legally entitled to publish or sell it without the consent of the writer. The author of any play or opera has the sole right over the acting of it within the British dominions.

Engravings, Prints, Lithographs, Paintings, Drawings, and Photographs are all C. It is an infringement of C. to copy an engraving by photograph (Gambart *v.* Ball in Court of Common Pleas, 1863). The property of designs, prints, and engravings is for twenty-eight years from the date of publication.

Designs in the Manufacturing Arts are protected by the Designs Act, by which C. is given to any original design for the ornamenting of any article of manufacture. The term of protection varies, however, according to the nature of the manufacture. It ranges from nine months to three years.

Prerogative Copyright.—The C. of certain works is exclusively vested in the crown. The most important of these is the Bible. On the principle of preventing a civil injury, which a court of equity can only redress, the Court of Chancery interferes to protect the owners of literary property, by issuing an injunction to restrain the sale of pirated copies, and an order to produce an account of such copies printed and sold.

The principle on which the court interferes being the protection of property, there must be a clear title in the party complaining, and the work must be of such a nature that damages might be recovered in a court of common law for pirating it; that is, the work must not be *immoral, blasphemous, libellous,* nor *seditious;* that is, it must not be so in its general tenor. Thus it has been decided that no action can be maintained for pirating a work which professes to be the *Amours of a Courtesan.* An action cannot even be maintained on a bill for printing a grossly immoral and indecent work. In *Lawrence* v. *Smith,* an injunction to restrain infringement of C. was refused on the ground of religious heterodoxy.

Coq'uerel, the name of two French Protestant pastors, who are likely to have considerable influence upon the destiny and doctrine of their Church. The elder, **Athanase Laurent Charles**, born at Paris, August 27, 1795, became, after a course of education at Montauban, first, minister of the Reformed Church at Amsterdam, and subsequently (1830) at Paris. He was a singularly eloquent pulpit orator, but the expression of Rationalistic or Unitarian opinions led to the division in the Reformed Church which has not yet been healed, although what is known as the 'Orthodox party' is in the meantime in the ascendant. C., who had been a member of the Corps Legislatif, but had not succeeded as a politician, died January 10, 1868. A collection of his sermons was published in 8 vols. (1819-59). His son, **Athanase Josué**, known till his father's death as *C. fils*, was born at Amsterdam in 1820, and both as a theologian and as editor of various periodicals, particularly the *Nouvelle Revue de Théologie*, expressed opinions similar to those of his father. For his views on M. Renan's *Vie de Jésus*, he was suspended by the Paris Consistory in 1864. He was, however, enabled to resume preaching, and became the recognised head of the 'Liberal' section of the Reformed Church. He was equally well known as a lecturer, and as an active writer of sermons, theological treatises, and ecclesiastical pamphlets. Among his works are *Jean Calas et sa Famille, Étude Historique* (1858), *La Saint-Barthélemy* (1860), and *La Conscience et la Foi* (1867). C. died at Paris, 26th July 1875.

Coquill'a Nuts, the seeds of *Attalea funifera*, a palm, the wood of which is now exported from S. America for the sake of being cut and polished into buttons, knobs of umbrellas, and such-like articles, which its hardness, susceptibility to polish, and beautiful mottled appearance make it very suitable for. See ATTALEA.

Coquim'bo, a province in the N. of Chili, S. America, between Atacama and Aconcagua. It is one of the largest provinces in the state, having an area of 13,300 sq. miles, and a pop. (1875) of 157,463. C. is richly metalliferous, especially in copper, but the soil is barren and water is scarce, and little grain is produced, though fruit abounds—in particular, grapes and figs. The only river of note is the *Rio C.*, which forms at its mouth one of the best harbours in Chili. The capital is La Serena (q. v.). C. is also the name of a small town at the mouth of the Rio C., on a fine bay with secure anchorage and a good depth of water. It is the port of La Serena, with which it is connected by railway, and has a pop. of 1270. In the neighbourhood are large copper-smelting works. The copper exported (which goes chiefly to England) amounted in 1873 to 15,000 tons, valued at £1,125,000. The chief imports are coal, coke, bricks, and grain.

Coqui'to, the Chilian name for *Jubæa spectabilis*, a palm found in Chili, and the sole representative of its genus. It is one of the most southern American palms, existing in great abundance between latitudes 33° and 35°. The sweet syrup known in Chili as *Miel de Palma* (palm-honey), is made by boiling the sap of this palm to the consistence of treacle. One tree, if carefully drained by cutting off the crown of leaves, will yield, in the course of several months, before it is exhausted, ninety gallons. The nuts are used in the preparation of sweetmeats, and by boys as marbles, while the leaves, trunks, &c., are used for many of the purposes to which all palms are applied.

Co'ra, Co're, or **Co'ri**, a town of Central Italy, province of Velletri, 30 miles S.E. of Rome, in a region producing wine and oil. Pop. 4000. It was an ancient possession of the Volscians, and one of the most important cities of Latium. On the hill on which it is built are still the interesting ruins of two temples, the one dedicated to Hercules, and the other to Castor and Pollux.

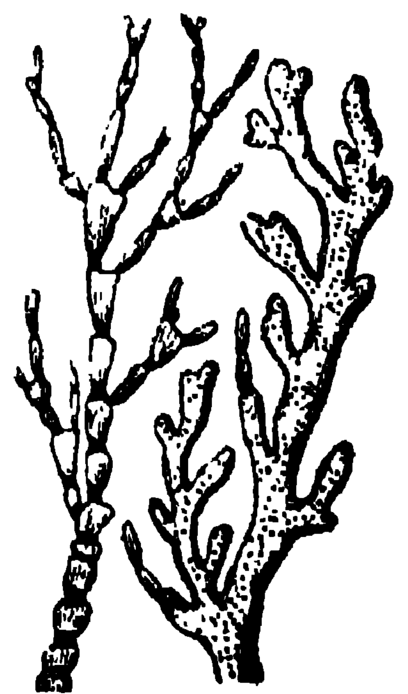
Cora'cias. See ROLLER.

Cor'acle, or **Currach** (Wel. *corwgl*, Gael. *curach*, Swed. *karf*, 'a yawl,' claiming affinity to Lat. *carabus*), a small oval row-boat, easily carried by one man, formed of a wicker-work or slender wooden frame covered with leather, hide, or other flexible waterproof material, used in S. Wales and elsewhere. The origin of the C. is unknown, but it is certain that this form of boat has come down to us from primeval times. Herodotus saw skin-clad boats on the Euphrates, and in Chesney's *Expedition to the Euphrates* mention is made that to this day the basket-work is sometimes, though rarely, covered with leather. The ancient Scandinavians are known to have made voyages of discovery in similar boats, and evidence of their use in Scotland is found in Beilenden's *Hystory and Chroniklis of Scotland*, which speaks of a fishing-boat called a 'currok' as 'ane bait of a bull hyd bound with na thing bot wandis.' Less than a century ago the C. was to be seen on the Spey. On the W. coast of Ireland, fishing is carried on in curraghs of a much larger size than usual. They consist of a light skeleton wooden frame, covered over with tarred canvas, measuring 20 feet long by 4 feet broad, and are capable of carrying four men, each of whom plies two short oars.

Cor'acoid Bones, so called from their supposed resemblance to a crow's beak (Gr. *korax*, 'a crow'), in reptiles and birds form the chief support of the shoulder-girdle and arm or fore-limb. In the monotremata or lowest mammals they also exist as distinct structures, but in all other mammalia as mere processes of the *Scapulæ* (q. v.) or shoulder-blades, under the name of *C. processes*. In most vertebrates below mammals, and in monotremata, the C. extends to and articulates with the *sternum* or breastbone directly. In birds it is the great support of the wing, and forms, with the scapulæ, the cavity (*glenoid cavity*), or the head of the *humerus* or bone of the upper arm.

Cor'aïs, Adaman'tios, or **Diamant Coray**, as he wrote his name in French, the first Hellenist of his day, was born at Smyrna, 27th April 1748. Having studied medicine, he settled in Paris in 1788. The French Revolution fired him with the idea of emancipating Greece from the Turkish yoke, and he set himself to inspire his countrymen with an emulation of the glory of their ancestors. He published annotated editions of many ancient Greek writers, and translated into modern Greek Beccaria's *Dei Delitti e delle Pene* (1802). C. died at Paris, 6th April 1833. See *Bios Adamantiou Koræ Suggrapheis para tou idiou* (Par. 1833). Two volumes of his correspondence were published at Athens in 1839.

Cor'al and **Coral Islands.** C., or *corallum*, is the name given to the hard structures developed in the tissues of *Actinozoa*, the highest class of Cœlenterate animals, and of which the Sea-Anemone (q. v.) or *Actinia* may be taken as the type. C. may be of two kinds, *sclerobasic* and *sclerodermic*. The latter is the more typical kind, and exists as an external covering, containing the polypes or animals that secrete it. This variety of C. structure is truly secreted within the tissues of the polypes, being formed by the *enderon* or inner layer of the ectoderm (the outer tissue of the body). Each polype thus manufactures a little cup of C., the wall of which is known as the *theca*, whilst internally the cavity bounded by the *theca* is divided into chambers or *loculi* by vertical partitions or *septa*. Sometimes horizontal partitions or *tabulæ* are developed, and others known as *dissepiments* may also exist. A sclerodermic C. may readily be known on looking at it, by noticing the separate little


Isis Coral.

cups of C. structure, which the individuals of the C. colony fabricate. Of the sclerodermic corals, which are the chief *reef-building* forms, the *Madreporidæ* or madrepores, the *Astræidæ* (star-C.), *Meandrina* (brain-C.), *Tubiporidæ*, or organ-pipe C., &c., are familiar examples. The *sclerobasic* or second variety of C. structure exists *within* the organisms, and appears as a more or less *solid* central rod or axis, coated by the living polypes as by a bark. Of this kind the red C., *Isis* or mare's-tail C., the *Gorgoniæ* or sea-shrubs, &c., are good examples. The sclerobasic C. is secreted by the *outer* surface of the polypes, and not *within* their bodies. It is thus named by Dana *foot-secretion.* The *outer* surface of the polypes that form the *sclerobasic* C. is in fact inverted and turned *inwards*, and hence the C. formed by the inverted outer surface comes to exist in the *centre* or *interior* of the living tissues. This C. forms branching, tree-like organisms, and from its nature bears little or no share in reef-building. No cups or separate C. structures for each of the polypes can be seen on inspecting a sclerobasic C. C. is not always, however, represented by such definite structures as denoted by the preceding remarks. Sometimes, as in *Alcyonaria*—of which *Alcyonium* (q. v.) is a good example—a sclerodermic corallum exists in the form of detached, fusiform, calcareous spicula or needle-like bodies, and the same may be said of the C. secretion of forms allied to our Sea-Anemones (q. v.). C. may also be of horny consistence, as in *Gorgonidæ*, or partly horny and partly limy, as in *Isis*.

Corals require for their life two great conditions—a temperature of sea not less than 66° Fahr., and a depth not greater than from 15 to 30 fathoms. A belt of about 1800 miles on each side of the equator marks the zone of distribution of corals. The red C. (*Corallium rubrum*) is found in the Mediterranean Sea, in depths of from 25 to 50 feet, and lower. It appears as a branching sclerobasic organism, each of the little polypes which comprise it having eight fringed tentacles. It is fished for by means of nets, and fetches high prices for its finer qualities. Its susceptibility of a high polish, its hardness and red colour, are the chief characters which give red C. its high value.

No C. reefs exist on the W. coast of Africa or in America, but on the Australian coasts, E. African coasts, Red Sea, Persian Gulf, Indian Ocean, all Polynesia, W. Indies, and Florida, they occur in immense numbers. The theory of C. reefs put forward in 1845 by Mr Darwin is that now universally accepted as explanatory of the erection of C. islands. A *fringing reef* is the first stage of erection, this reef fringing the shores of the land at a depth (15 to 30 fathoms) suitable for the polypes. If the land begins to sink or subside, the lower corals are carried out of their depth and die, whilst those at the top build upwards at a rate corresponding to the subsidence. Thus a *barrier reef* is formed, which encloses a sheet or belt of water between it and the original land. If the barrier reef sink in its turn, an *atoll* or *lagoon reef* (the perfect form of C. island) is produced—this latter appearing as a circular ring of C., enclosing a lake or lagoon which communicates with the outer sea by a break in the C. ring. Darwin's theory is thus wholly dependent on the phenomena of the subsidence of land; and his views have gradually and surely supplanted the old ideas that the C. polypes began at the bottom of the ocean and built upwards, since it has been shown that they can live in *limited* depths of sea only. A depth of 200 feet is about the maximum depth at which reef-building corals can live. Some C. reefs are of large size. The great barrier reef on the N.E. coast of Australia runs uninterruptedly for a length of more than 1000 miles, and other reefs and atolls are proportionately large. Different corals inhabit different parts of a reef. The foundation appears to be formed by *Astræas*, which live at about 6 fathoms depth. To these succeed *Meandrinas* and *Porites;* the upper parts and summit of the reef being formed by *Madrepores, Millepores*, and *Gorgonidæ.* The reader may with advantage consult Darwin's work on *C. Reefs*, and also Dr James D. Dana's *Corals and Coral Islands* (1875).

Coral-Berry, an American name for *Symphoricarpus vulgaris.*

Cor'allin, a red colouring matter, first obtained in 1861 by the German chemists Kolbe and Schmitt, by heating phenol with sulphuric and oxalic acids, and now extensively prepared as a commercial product, under the names of *Aurin* or yellow C., and *Peonin* or red C. The constitution of these dyes is complex and slightly different. Aurin yields peonin on being heated with alcoholic ammonia. Yellow C. forms a stable lime-lake with excess of lime, and is employed largely by paperstainers. Red C. is much used for printing fabrics and dyeing wool, but the colour fades into yellow in contact with acids, unless an alkaline body be mixed with the dye. By the use of calcined magnesia in an alcoholic or aqueous solution of red C., a rich and durable Turkey red is obtained.

Cor'alline and **Coralline Crag.** The name *C.*, often erroneously supposed to denote *Coral* (q. v.), is now restricted, and applied in zoology to indicate various kinds of *Polyzoa*, or lower molluscan animals. Of these forms, the bull's-horn C. (*Scruparia chelata*), the snake-head C. (*Ætea anguina*), the coat-of-mail C. (*Gemellaria loricata*), the shepherd's-purse C. (*Notamia bursaria*), and the bird's-head C. (*Bugula avicularia*) are familiar examples. The C. C. is a deposit belonging to the Pliocene period, averaging from 20 to 50 feet in thickness, and deriving its name from the abundance of its fossil 'corallines' or Polyzoa (q. v.). This deposit is well developed in Suffolk, and of its polyzoa the genera *Cellepora, Theonoa*, and *Fascicularia* are familiar examples. Many marine molluscs (about 350 species) and echinoderms also occur in the C. C.

Coral Rag, a formation belonging to the middle Oolite or Juras series (*Mesozoic*) of rocks, and consisting of from 150 to 250 feet of limestone, lying above the Oxford clay. It derives its name from the number of fossil corals found in it, these fossils belonging to such genera as *Isastræa, Thamnastræa, Stylina*, and *Thecosmilia.* In Oxfordshire and Wiltshire this deposit may be typically seen. Abundant mollusca, echinoderms, and a few fish remains occur in the C. R.

Coral Root, the common name for *Corallorhiza*, though sometimes applied to *Dentaria bulbifera.*

Coral Sea is that portion of the S. Pacific included between Australia, New Guinea, the New Hebrides, and the 29th parallel of S. latitude. It derives its name from the coral reefs with which it abounds, and which, in the opinion of Dana (*Corals and Coral Islands*), indicate a subsidence of the land of more than 2000 feet. See NEW CALEDONIA.

Coral Tree, or **Coral Flower**, the common name for *Erythrina* (q. v.). The *Coral Plant* is *Jatropha multifida.*

Cor Anglais, a species of bass oboe, not now used in the orchestra.

Cora'to, a town in the S. of Italy, province of Terra de Bari, 25 miles W. of Bari. It has some fine churches and convents, and a trade in wine, oil, and southern fruits. Pop. 24,600.

Cor'bel (Fr. *corbeille*, 'a basket'), in Gothic architecture, a projecting bracket, sometimes in the form of a basket, but often variously sculptured, which supports a superincumbent weight or receives the spring of an arch. A row of corbels supporting a battlement, parapet, or cornice is called a *C.-table.* See BRACKET, CONSOLE, MODILLION.

Cor'bie, Corby, or **Corbeau** (Lat. *corvus*, 'a raven'), in heraldry, bears its etymological meaning.

Corbie-Steps, or **Crow-Steps** (Fr. *corbeau*, Lat. *corvus*), in architecture, steps up the sides of a gable. This picturesque finish to the end wall, as it narrows along with the slope of the roof, is frequently to be met with in old houses, especially in Flanders, Holland, Germany, and Scotland. The popular notion is that the steps are meant for the crows. The top step is called the crow-stone.

Cor'chorus, a genus of plants of the lime-tree order (*Tiliaceæ*), containing between forty and fifty species, inhabitants of both hemispheres, but generally not found far from the tropics. *C. capsularis*, an annual Asiatic plant, and *C. olitorius*, a closely allied species, both much cultivated in India, yield the fibre so well known as Jute (q. v.), and the fibre used in making Gunny Bags (q. v.). *C. olitorius*—the *Corette potagère* of the French gardens, now naturalised in all parts of the tropics, and as far N. as the Mediterranean—is sometimes called the *Jew's mallow*, from being much cultivated for the sake of its tender shoots as a potherb by the Jews of Syria and the East generally. *C. capsularis* (sometimes also called *Chinese hemp*, owing to its being extensively cultivated in China) is used also

for the same purpose. The leaves of *C. siliquosus* of the W. Indies and tropical America are used by the negroes in the former islands and by the inhabitants of the Isthmus of Panama for making an infused beverage called *te*, and, as the name would indicate, used as a substitute for tea.

Cor'dage, a nautical term applied to the running rigging of a ship, as distinguished from the standing rigging, and also to the store of ropes kept in reserve.

Cor'day d'Armans, Mariane Charlotte, born at St Saturnin in 1768, the second daughter of a poor nobleman, passed much of her youth in a monastery at Caen. She studied Rousseau and Plutarch incessantly. Caen became a retreat for the Girondists when they were expelled from the Convention. Excited by their tales of blood, and by the murder of Colonel de Belzunce, C. took the resolution of striking a blow for the peace of her country, and, with an introduction from Barbaroux, went to Paris alone. After several days' watching, she was admitted to an audience with Marat, whom she killed by a stroke of her knife as he sat in his bath. She confessed and justified her crime on grounds of patriotism, and died on the scaffold, with great courage and serenity, on 17th July 1793.

Cordeliers ('wearers of the knotted cord') was the French name for the strictest branch of the Franciscans. The name received a new significance during the Revolution in 1790, when it was given to the club of Danton, Camille Desmoulins, Marat, and Hébert, which met in a Franciscan monastery.

Cord-Grass (*Spartina*), a genus of grasses, of which one species (*S. stricta*), a native of the muddy salt marshes of the E. and S.E. coasts of England, is used for making ropes. Elsewhere it is rare.

Cor'dia, a genus of plants comprising nearly all of the *Cordiaceæ* (q. v.), and containing upwards of 180 species, mostly trees or shrubs. The fruits of *C. latifolia* and *C. Myxa* of India are succulent, mucilaginous, and emollient, and are accordingly eaten. Under the name of *Sebestens* or *Sebesten-plum* they have been employed in chest-complaints as pectoral medicines, a use to which those of *C. Abyssinica* (Wanzey) are also applied in Abyssinia. Those of *C.* (*Varronia*) *rotundifolia* are used to fatten cattle. The bark of *C. Myxa* is used in India as a tonic, and for making astringent gargles. Its wood is said to have been that employed by the Egyptians to make their mummy cases. That of *C. Rumphii* is brown veined with black, and smells of musk. From *C. Gerascanthus* is obtained the dark-brown-veined and fine-grained timber known in commerce as Spanish elm, Prince wood, or *Bois de Chypre* of the W. Indies. Anacuhuite wood, imported a few years ago as a tonic, &c., is obtained from *C. Boissieri*.

Cordia'ceæ, a tribe or sub-order of *Boraginaceæ*, though sometimes described as a separate order of plants. There are about 200 species known, natives chiefly of the tropics of the Old and New Worlds, and distributed over about twelve genera, but most of these have been delegated to the genus *Cordia* (q. v.).

Cor'diceps, a genus of Fungi (q. v.) which grows on dead leaves, decaying branches, ergoted seeds, and upon the pupæ and larvæ of insects. *C. Robertsii* grows upon the caterpillars of a species of New Zealand *Hepialus*. One species attacks wasps in the W. Indies, and attains a considerable size before the insect dies. The Chinese sell *C. Sinensis* in little bundles, under the belief that it is a drug possessing medicinal properties. See ERGOT.

Cordille'ras, a word applied by the Spaniards of America to mountain chains, and formed from a root meaning a string or rope. The C. of S. America form part of the Andes (q. v.), and those of Central America extend from the Isthmus of Panama northward through Mexico to the borders of the United States.

Cor'don (Fr. *cordon*, 'a line, a girdle'), in military language, is a line of troops drawn round a town or district, sufficient to prevent ingress or egress, if requisite. If the sentries so placed are intended as a precaution against some contagious disease, they are called a *C. sanitaire*. In fortification, the term means the coping of the escarp or inner wall of a ditch, which is usually rounded in front, and projects about a foot over the masonry.

Cor'dova, or Cor'doba, the capital of the province of C., Spain, on the right bank of the Guadalquiver, which is here crossed by a Moorish bridge of fifteen arches, 65 miles N.E. of Seville. Its wall, also Moorish, is pierced by thirteen gates, of which that named *Puente* consists of a fine arch supported by four Doric pillars. There are numerous large squares, and many of the houses possess marble porches, and have sparkling fountains in their courts. The streets, however, are narrow and filthy. The cathedral, originally a mosque, and occupying the site of a Roman temple of Janus, is the finest in Spain, and is famous for its 'forest' of marble, jasper, and porphyry pillars, of which there are still 850. The bishop's palace, now degraded into stables, the churches of San Hipolito, of Santa Marina, of San Salvador, with some monastic buildings, are the other most remarkable structures. The manufactures, once important, have much fallen off. They consist of paper, silk-stuffs, hats, silver-work, and the leather known from C. as *Cordovan*. Since the opening of the railway, however, to Seville and Cadiz, the commerce of the city has begun to increase. Pop. 41,963. C. was founded by the Consul Marcellus (B.C. 152). Under the Romans it was the greatest and most flourishing city in Spain, and the seat of the supreme tribunal for Bætica. In the 6th c. it became the see of a Visigothic bishop, and from 716 was the capital of the Moslem power in the Peninsula. It reached the height of its prosperity in the time of the Califs Abd-ur-Rahman III. and IV., when it is said (doubtless with exaggeration) to have been upwards of 20 miles in circumference, to have had 200,000 houses, and 1,000,000 inhabitants. At that time it possessed a famous Moslem university, 80 public schools, a library of 600,000 vols, 600 mosques, 900 public baths, and many splendid palaces. Its greatness gradually declined after its conquest by Ferdinand III. of Castile in 1236. The Senecas, father and son, Lucan the poet, and Averroes were all natives of C.

Cordova, the capital of the province of C, Argentine Republic, lies in a beautiful valley on the Primero, an affluent of the Parana. It has a cathedral, a trade in hides and wool, and was long the residence of a bishop. Pop. (1869) 28,523. The *province* of C., in the heart of the republic, has an area of 58,997 sq. miles; pop. (1869) 210,508. It abounds in excellent pasturage, and cattle and sheep are reared in great numbers.

Cor'dovan, Spanish leather, or cordwain, made of goatskins tanned and dressed, and used in the finer kinds of boot and shoe making, as well as in bookbinding. It was originally manufactured by the Moors at Cordova, hence the name. The same fact explains why shoemakers are called *cordwainers*.

Core'a (called by the natives *Tsjo-sjön*, by the Chinese *Kaoli*, whence the Japanese *Korai*, the origin of our form, *Corea*), a kingdom of Eastern Asia, under the suzerainty of China, bounded N. by Manchuria, E. by the Sea of Japan, S. by the Strait of Corea, and W. by the Yellow Sea, and a neutral uninhabited mountainous district, separating it on the N.W. from the Chinese provinces of Shing-king and Liao-tong. It is peninsular in form, and has numerous groups of islands belonging to it in the Yellow Sea and the Strait of Corea, of which the largest is Quelpaert. Area, 91,400 sq. miles; pop. estimated at from 7,500,000 to 9,000,000. C. is divided into eight provinces; its capital is Han-yang. A mountain chain traverses the peninsula through its entire length, covered in part with dense forests, and fairly fertile, especially on its western slope, which is well watered. The rivers, from the conformation of the land, are small, the chief of them being the P'ing Jang and the Han. The climate is excessively hot in summer and cold in winter, and the rainfall is excessive. Agriculture is not in an advanced condition; but the S. produces in abundance wheat, cotton, rice, millet, and hemp, and barley is grown in the N. The rice, which forms the principal food of the inhabitants, is inferior to that of Japan. Paper and ginseng are exchanged with the Chinese. The former manufacture is important, paper entering into the construction of hats, umbrellas, clothing, &c. Corean sabres and poniards are much prized in Eastern Asia, the natives being skilled workers in metals.

The Coreans are of the Turanian stock, and speak a polysyllabic language of great purity, but becoming gradually corrupted by an infusion of Chinese words. The Chinese character is generally used in writing. The religion resembles that of China, but there are numerous Buddhists. C. studiously pro-

hibits intercourse with other nations, with the exception of the Chinese and Japanese. That with the former is limited to the annual embassy, and to periodical fairs at the 'Gate-town,' near Fêng-hwang, in Manchuria, while the Japanese are allowed to trade only at the single port of Fu-tschan. Recently there have been disputes between the Coreans and the Japanese, and in 1875 the latter threatened to invade the country. In 1592 Christianity was introduced into C. through Christian converts from Japan. Jesuit missionaries established themselves in 1784; some French missionaries obtained a footing in 1835, and continued to proselytise with much success till 1866, when nine of them were massacred. A French retaliatory invasion, and two American expeditions, have not succeeded in removing the opposition of the Coreans to intercourse with outside nations. See Williamson's *Journeys in N. China* (1870), and *Histoire de l'Église de Corée, par Ch. Dallet, Missionaire Apostolique* (Par. 1874).

Coreg'onus, a genus of Teleostean fishes, included in the Salmon family (*Salmonidæ*), and distinguished by the height and forward position of the first dorsal fin. The scales are large, the teeth very small or rudimentary. The *pollan* (*C. Pollan*), occurring in Irish loughs, such as Loughs Derg, Erne, and Neagh, is an example of this genus; so are the *powan* of Loch Lomond and Lochmaben, and the *gwyniad* of Welsh and Cumberland lakes. These fishes frequently get the names of 'fresh-water herrings' and 'herring salmon.' The white fish of N. America is the *C. albus*.

Corell'i, Arcangelo, an Italian musician, was born at Fusignano in 1653, educated under Simonelli and Bassani, travelled much through Europe, where he himself and his compositions were everywhere popular, and settled in Rome in 1681. He died 18th January 1713. C. has been justly called the father of modern instrumental music; his trios, for violins and bass, with organ accompaniment, although written just two centuries ago, are as fresh and bright as if composed yesterday, and are probably even more familiar to violin-players now than they were in the time of their composer.

Corentyn', a river of S. America, dividing Dutch from British Guiana, rises in the mountain range which forms the southern boundary of the country, flows in a general northerly direction, and after a course of 300 miles falls into the Atlantic 120 miles E.S.E. of Georgetown. Its estuary at its mouth is 25 miles broad. The C. is navigable for boats to where it is joined by the Cabalaba, 150 miles from the sea.

Coreop'sis (Gr. 'maiden's eye'), a genus of American Herbaceous plants, belonging to the order *Compositæ*, containing several species. The flowers of *C. verticillata*, a shrubby perennial species, are used in N. America to dye cloth red.

Corfe Castle (the *Corfes-geat* of the *Chronicle*, in allusion to the 'gate' or 'gap' in the ridge that runs along the peninsula), a village in the 'isle' of Purbeck, Dorsetshire, 24 miles E.S.E. of Dorchester. There are quarries of Purbeck marble in the vicinity, where also immense quantities of potter's clay are dug for the Staffordshire potteries. Pop. (1871) 1806. From the reign of Elizabeth to the Reform Bill of 1832 it sent two members to Parliament. The village grew up round the ancient castle, which seems to have been founded in the 10th c., though it is not entered in the Survey of William I. Here Edward the Martyr was murdered in 979, and King John starved to death twenty-two of Arthur's supporters in 1202. Here also Henry of Montfort was imprisoned in 1275. Lady Bankes in 1642 held the castle for six weeks against the forces of the Parliament, and Fairfax dismantled it in 1645.

Cor'fu (anc. *Corcyra*), the most northerly of the Ionian islands, is about 40 miles long, with a breadth varying from 3 or 4 to about 18 miles. Area, 227 sq. miles; pop. (1871) 72,466. It is rocky and mountainous—one peak, Pandokratora, rising more than 3000 feet above the sea. The valleys and level tracts are fertile, yielding oil, wine, fruit, honey, and some corn. Salt, produced from the marshes communicating with the sea, and oil are the chief articles of export. Value of exports in 1873 £162,158; of imports, £359,803. The *town* of C. is finely situated on an elevation overlooking a safe and spacious bay on the E. side of the island. It is the seat both of a Greek and of a Roman Catholic archbishop, has considerable shipbuilding, and a large trade. Pop. (1871) 15,452. The University of C. was suppressed in 1864, when the Septinsular Republic was annexed to Greece. C. is also the name of a *nomarchy* extending over the adjacent island of Pasco, and having an area of 428 sq. miles, and a pop. (1870) of 96,940.

Corian'der (*Coriandrum sativum*), an annual plant of the natural order *Umbelliferæ*, is a native of Southern Europe and the Levant, and cultivated in this and other countries. The seeds or fruits are carminative and aromatic, and are accordingly used for flavouring curries and spirits, and in making comfits, &c.

Coriar'ia, a genus of shrubs, by some considered the type of a separate order (*Coriariaceæ*), consisting of eight species. It is most nearly allied to *Ochnaceæ* (q. v.), but its affinities are by no means well understood. They are natives of the S. of Europe, Chili, Peru, New Zealand, and one (*P. Nepalensis*) is found in Nepal. The fruits of the latter species, as well as those of *C. sarmentosa* of New Zealand, are eaten, but the genus generally is regarded with suspicion, the seeds of *C. sarmentosa* (the 'wine-berry' shrub) being poisonous, though the pericarp of the fruit is wholesome. An agreeable 'wine' is made from it, which tastes like that made from elder-berries. The seeds, however, cause convulsions and delirium, which often end fatally. Sheep are frequently poisoned by eating the plant. The fruit of *C. myrtifolia*, a European species, is said to have proved fatal to some French soldiers who partook of it in Catalonia. The leaves have been used to adulterate senna, and have caused tetanic convulsions in those who have partaken of the adulterated drug. They owe their poisonous properties to a glucoside called *coriamyrtine*. C. is also used in dyeing black.

Coriglia'no (anc. *Coriolanum*), a town of Italy, province of Calabria Citeriore, overlooking the Gulf of Taranto, from which it is about 4 miles distant. It has a citadel, customhouse, hospital, and several churches and convents, and a trade in wine, oranges, olives, and lemons. Pop. 13,204.

Corin'ga, a town of British India, province of Madras, district of Godavari, at the mouth of the river C., a branch of the Godavari, and 290 miles N.N.E. of Madras. Its harbour is one of the finest on the coast. The inhabitants are principally engaged in the building and repairing of coasting vessels. Pop. (1870) 15,000.

Corinn'a, a Greek poetess, a native of Tanagra in Bœotia, flourished about the beginning of the 5th c. B.C., and was a contemporary of Pindar, from whom she wrested at least one victory at the public games at Thebes. Her poems, chiefly lyrical, were composed in the Æolic dialect. They were collected in five books, but only a few fragments remain, which may be found in Bergk's *Lyrici Poetæ Græci* (Leips. 1843). Statues were erected to her in several towns of Greece. She is often spoken of under the surname of *Muia* ('the fly').

Cor'inth (originally *Ephyra*), one of the most famous cities of ancient Greece, stood at the S.W. extremity of the isthmus which connected Hellas with the Peloponnesus. Its citadel, the Acrocorinthus, an isolated rock 1886 feet high, together with the walls which connected the city with its port, enabled C. to command the three passes which led from the isthmus to the Peloponnesus. The city, lying at the base of this natural fortress, and between two important seas, soon became a great commercial centre. The earliest established fact in the history of C. is its conquest by the Dorians led by Aletes, who with his descendants exercised regal sway for twelve generations. The Bacchiad oligarchy succeeded, under whom the city began to enlarge its commerce with the West, establishing colonies in Corcyra and Syracuse; but after lasting ninety years, this oligarchy was overthrown by Cypselus, aided by the general body of the populace, B.C. 657, and a democratic 'tyranny' followed of seventy-seven years, during which C. rapidly prospered. Under Cypselus and his son Periander (B.C. 625–585) it formed a chain of trading stations on the coasts of Ætolia, Acarnania, Epirus, and Myria, and spread its authority over the whole western sea; while by its colony of Potidæa in Thrace, and its alliances with the Greek towns of Asia Minor and with the kings of Lydia and Egypt, it established its influence in the East. On the expulsion of Periander's son a moderately aristocratic system was again introduced, and C. became a member of the Peloponnesian league under the leadership of Sparta, and as such took part in the great

Peloponnesian War. Becoming jealous of the growing power of Sparta, C. united in B.C. 395 with other Grecian states against it, and in the 'Corinthian War' that followed (B.C. 394–387) suffered greatly. After the battle of Chæroneia (B.C. 338), C. was held by the Macedonian kings, but as a consequence of the battle of Cynoscephalæ (B.C. 197), obtained its freedom, entered the Achæan League, of which it became the centre, and was totally destroyed by Mummius, who carried to Rome its priceless works of art (B.C. 146). A century later it was rebuilt by Julius Cæsar, but during the Empire was merely the shadow of its former self. St Paul founded here a church, to which he addressed two epistles. In 1458 A.D. it was captured by the Turks, who held it, with the exception of a few years when it was in the possession of Venice, till 1823. In 1858 it was destroyed by an earthquake, but it is now being rebuilt. It is in the nomarchy of Argolis and Korinthia, and had in 1870 a pop. of 1862.

Ancient C. was famous as a seat of art. Here painting is said to have been invented, and statuary, especially in works of bronze, reached especial excellence. Hence statuary metal was known as Corinthian brass. As a result of its wealth, and from its being a resort of traders and mariners, it acquired an evil fame for licentiousness. Some of the courtesans of C., as, *e.g.*, Lais, were so famous and extortionate that only the richest merchants could venture to approach them.

The Gulf of Corinth, or Gulf of Lepanto (anc. *Corinthiacus Sinus*), an inlet of the Ionian Sea, 75 miles long, with an average breadth of 15 miles, extending eastward through the centre of Greece, which it almost divides into two parts, and forming the N. boundary of the Morea. It is separated from the Gulf of Egina by the Isthmus of C., which is in places not more than 5 miles broad. Nero attempted to unite the Ionian and Ægean seas by cutting through the isthmus, but he found the engineering difficulties insuperable.

Corinth'ians, Epistles to the. Two were written by the Apostle Paul, as is commonly supposed, in 57–59 A.D., during the period in which, after leaving Corinth (Acts xviii. 18), he took up his residence at Ephesus (Acts xix. 1). The scope of the epistles is to 'rebuke party contentions and other fanatical disorders, incidentally defending Paul, as teacher of an all-embracing spiritual religion, in opposition to those who assailed his authority on carnal grounds.' It is also supposed from 1 Cor. v. 9 that he had previously written to the Corinthians, but nothing further is known of the epistle. There is also an epistle to the C. by Clemens of Rome (q. v.).

Corinth'ian Order. See COLUMN.

Coriola'nus, Caius or **Cænus Marcius**, was a legendary hero of early Rome, whose surname was conferred from the bravery with which 'he charged the Volscian home' at the capture of their chief city, Corioli. He was a proud and implacable enemy of the commons, and for having advised, during a famine, that corn should not be distributed to them unless the tribunes were discharged, he was condemned to exile. He joined the Volscii, and at the head of their army made successful war on Rome, and advanced to the Cluilian dyke. He turned a deaf ear to the entreaties of the citizens, till his mother Veturia and his wife Volumnia, accompanied by the noblest matrons of Rome, went to plead with him, when he withdrew his army. He died in exile. The date of the legend is 490 B.C.

Co'rium. See SKIN.

Cork (Span. *corcho*, from the Lat. *cortex*) is the outer bark of a species of oak (*Quercus suber*), a native of Southern Europe and of Northern Africa, and specially abundant in Portugal, Spain, the South of France, and the islands of Sardinia and Corsica. The cork-tree grows from 30 to 40 feet high, measures 2 or 3 feet in diameter, and surpasses all other trees in the remarkable development of soft cellular tissue in its bark, which thereby possesses a degree of compressibility and elasticity that renders it peculiarly fitted for many common uses. The C., of which the great mass of the bark is composed, is systematically removed every six or ten years—an operation which, singularly enough, promotes a hardier and more vigorous growth of the tree, and leads to the production of C. of a finer and closer texture. The first crop, taken when the tree is from fifteen to twenty years old, is of an inferior quality, being cracked, woody, and hard, and suitable for making floats for fishermen's nets or for rustic garden-work. The usual mode of barking is to make two longitudinal cuts on opposite sides of the tree, under the main branches, and then a number of transverse incisions, which admit of the C. being removed in semi-cylindrical pieces not less than 1½ inch thick, with the aid of a curved implement. While incising the C., great care is taken not to injure the inner bark. The detached pieces are soaked in water and flattened by heavy weights, and to give a closer texture the C. is slightly charred on the surface over a fire. The imperviousness of C. to liquids, and its compressibility and elasticity, render it extremely suitable for stoppers to bottles and for bungs to barrels, &c.; its other uses are mainly as inside soles for boots, hat frames, life-preservers, false limbs, mattresses, and the construction of lifeboats. With caoutchouc it constitutes the kind of floorcloth called Kamptulicon, and C. chips when burned form *Spanish black*. In Spain, walls are lined with C. to overcome dampness. In the Maritime Exposition held in Paris in 1875, a novelty in the shape of 'C. leather' was exhibited. It simply consists of thin sheet-C. covered on both sides with linen, and its suitability, as advocated by its inventor, M. de Berski, for tent-coverings and military accoutrements is now being tested. Corks for bottles are mainly made by hand, being cut into the cylindrical or tapering shape from small square blocks by means of a broad-bladed knife, very thin and fine edged. Cork-cutting is an important industry in many Spanish and French districts, and the corks manufactured in these countries excel those of English make. Cork-cutting machinery, though in operation with partial success in some places, has hitherto failed to supersede manual labour to any great extent. One machine, of peculiar construction, originally made by Messrs Hammer & Butz of Philadelphia, and protected by patent in this country, consists of mechanism for transforming the bark into various descriptions of corks and bungs, all the successive operations being conducted simultaneously at different parts of the machine. Cork-cutting is a most wasteful process, the clippings and trimmings constituting 70 per cent. by weight. A new use has recently been found for this waste, as experiments at Bordeaux have demonstrated that good illuminating gas may be obtained from it on distillation in close retorts. In 1873 the imports, free of duty, into Great Britain were 6814 tons of unmanufactured C., almost all from Portugal, and 5,680,206 lbs. of manufactured C., one-half of this quantity being French produce.


Cork-Tree.

Cork, Korker, or **Korkalett**, a name applied in the Highlands of Scotland and in Shetland to a Lichen (q. v.), *Lecanora tartarea*, which, according to Dr Lauder Lindsay, is made into a domestic dye 'by macerating the powdered lichen for some weeks in putrid wine, with the addition of kelp or salt, and when the requisite crimson or purple tint is obtained, forming the paste into balls or lumps with lime or burnt shells, and hanging it in bags to dry. When used, it is powdered, and then boiled in water with a little alum' (Berkeley).

Cork, a city in the S. of Ireland, province of Munster, and capital of the county of the same name, built partly on an island on the Lee, and partly on the N. and S. banks of the river, is distant from Dublin 165 miles by the Great Southern and Western Railway. The site was originally a swamp, and known as *Corcach-mor-Mumhan*, 'the great marsh of Munster,' and C. is still called *Corcach* by the Irish-speaking population. The city has spacious streets, handsome public buildings, nine bridges, a public park, a fine cemetery (after the plan of Père-le-Chaise),

and the Mardyke, a splendid promenade, a mile long, and shaded on each side by a double row of noble elms. Among the principal buildings are St Anne Shandon's Church, with a tower 170 feet high, the bishop's palace, and Queen's College, the Chamber of Commerce, Corn Exchange, Customhouse, County Club, &c. The harbour of C. is distinguished into the upper and lower, the former of which has quays extending nearly 5 miles, and can accommodate vessels of 600 tons. The lower harbour, formed by the estuary of the Lee, is one of the safest and most capacious in the empire. It contains several islands, on the largest of which, Great Island, is the town of Cove, now Queenstown (q. v.). The other islands are occupied by convict and ordnance depots, powder magazines, and a bomb-proof artillery barrack. In 1873 the number of vessels that entered the port was 2451, with a tonnage of 638,047, and the number that cleared was 1497, with a tonnage of 449,184. The principal manufactures are leather, iron, glass, gloves, malt liquors, and whisky. C. exports grain, live stock, linen, butter, and bacon. It has returned two members to Parliament since 1374. Pop. (1871) 100,518. The city dates from about the year 600, when St Barr or Finbarr founded an abbey here. It was long held by the Danes, received an English garrison and governor in 1172, but was twice recovered by the Irish before the close of the century, when it finally came under English authority. It was faithful to Elizabeth during the insurrection of Desmond, was taken by Cromwell, and again by William III.; and since then has not been the scene of any important historical incident. C. is the birthplace of many notable men; the painters Barry, Butts, and Maclise, the sculptor Hogan, the antiquary Wood, and the travellers Hastie, Murphy, O'Leary, &c.

Cork, a maritime county in the province of Munster, and the largest in Ireland, having an area of 1,849,686 acres. It is bounded N. by Limerick, E. by Tipperary and Waterford, S. by St George's Channel, and W. by Kerry; has an extreme length of 110 miles, and a breadth of 70. The W. part is rugged and mountainous; the S. and E. extremely fertile. The coast, bold and rocky, has numerous indentations, which furnish excellent harbours and roadsteads; and many islands lie along it, of which Cape Clear is reckoned the most southerly point in Ireland. The Bandon, Lee, and Blackwater, the principal rivers, flow eastward in parallel courses, separated by offshoots from the mountain range in the W.; there are several lakes, but of no great size. The climate, though moist, is mild and salubrious. The soils vary much; dairy farming is carried on extensively, and the butter of C. is of superior excellence. The cattle are small, but yield milk in abundance. The principal minerals are coal, occupying an area of 400 sq. miles, in the N.W. of the county, iron, copper, manganese, limestone and brick clay. The copper-mines are the most valuable in Ireland. The principal manufacture is linen; there are also numerous distilleries and breweries, and fishing is carried on to a considerable extent. The county returns two members to Parliament. Pop. (1871) 517,076, a decrease of 27,742 since 1861, or at the rate of 5·09 per cent. The Roman Catholics number 467,621, or 88 15 per cent. of the population. From 1st May 1851 to 31st March 1871, 266,678 persons emigrated from the county and city of C. The antiquities of the county are stone-circles, cromlechs, raths, caves, and religious houses. There are also some remains of those strong fortresses and towers by which the English overawed the natives in old times; but perhaps the place of most pleasant and abiding interest to a stranger is Blarney Castle, the ancient seat of the M'Carthys, and famous for its 'stone,' whose virtues are deliciously described in Father Prout's *Groves of Blarney*.

Corleo'ne, an old town of Sicily, province of Palermo, on a hill near the source of the Belici, 20 miles S.E. of Alcamo. Convents and churches are the principal public buildings. Pop. 15,350.

Corm is a fleshy underground stem, distinguished from a bulb by not being scaly, but only covered with thin membranes. It may be described as a bulb in which the scales are all solidified into one mass, or it may be regarded as 'a much shortened rhizome, consisting of a few undeveloped internodes.' Examples are afforded by the crocus, arum, tulip, &c.

Cor'menin, Louis Marie de la Haye, Vicomte de, a French statesman and jurist, was born at Paris, 6th January 1788. He acquired very considerable influence during the reign of Louis Philippe by his knowledge of jurisprudence, and the strong common sense which he brought to bear upon the work of practical administration. After the Revolution of 1848 C., who was an advocate of universal suffrage, was made president of the commission which was appointed to remodel the constitution. Subsequently to the *coup d'état*, he was made a member of the Council of State and also of the Institute. He wrote many pamphlets, and is the author of a work on the administrative law of France (*Droit Administratif*) which has been very popular. His *Études sur les Orateurs Parlementaires* and *Le Livre des Orateurs* have reached nearly twenty editions. C. died at Paris, May 6, 1868.

Cor'morant (*Phalocrocorax*), a genus of Natatorial birds, belonging to the family *Totipalmatæ*, in which the hinder-toe is directed inwards, and united to the innermost of the three front toes by a web or membrane. The skin of the throat in the C. is distensible. The nail of the middle toe is serrated. The bill is compressed and rounded above, the upper mandible being strongly hooked at its tips. The nostrils are of linear shape. These birds are widely distributed throughout the world, the common C. (*P.* or *Graculus carbo*), and the green C. or Shag (*P. graculus*, or *Graculus cristatus*), being found in Britain. The common C. has black plumage, the feathers of the head and neck being whitish. It is about 33 inches long, and is a bird of powerful flight, and exceedingly voracious, feeding on fishes, which it catches with great dexterity, often throwing the prey into the air and catching it in its bill so as to swallow it in a convenient manner. The green C. is of a green colour, and the fishing-C. (*P. sinensis*), an inhabitant of China, is trained to catch fish for its masters. The name, which means 'sea-crow,' is partly of Latin and partly of Celtic origin, *cor* being the Lat. *corvus*, and *mor* the Welsh and Armoric for 'sea,' allied to the Lat. *mare* and the Ger. *meer*.


Cormorant.

Corn (Ger. *korn*, Goth. *kaurn*, allied to the Lat. *granum*), a term applicable to any grain, but usually applied to the seeds of Cereals (q. v.) used in making bread. In different countries it has, however, specific meanings, chiefly determined by the more prevalent use of the grain to which it is applied—*e.g.*, in America, by 'C.' is universally understood Indian-C. or maize, while in Scotland oats, and in England wheat, are more generally understood when the term C. is used. In the Bible it is usually applied to wheat—*e.g.*, when Joseph's brethren went down into Egypt 'to buy C.' Broom-C. is *Sorghum Dora*; Kaffir-C., probably *Sorghum saccharatum*; goose-C., *Juncus squarrosus*; Guinea-C., *Sorghum vulgare*, a name applied in the West Indies to several species of *panicum*-bearing edible grain, &c.

Corna'ceæ, the Cornel or Dogwood order, a family of Dicotyledonous trees or shrubs, rarely herbs, natives of temperate Europe, Asia, and America, containing in all about forty species and new genera, of which *Cornus*, *Benthamia*, and *Aucuba* are types. The order is remarkable for its tonic, febrifuge, and astringent properties. The bark of *C. florida* (dogwood bark), and other species of C., is esteemed in the United States and Canada as a substitute for Cinchona (q. v.), and contains a similar principle, called *cornine*. The astringent fruit of *C. mascula* (the Cornelian cherry) is known to the Turks as *krania*, who use the juice in their sherbets, and for other purposes in which an agreeable acid flavour is valued. The fruits of *C. suecica* are eaten, and also possess tonic properties. The seeds of *C. sanguinea* yield a fixed oil burnt in lamps. Charcoal is prepared from the wood, though the 'dogwood' from which most of the charcoal of the gunpowder-makers is made is *Rhammus Frangula* (Buckthorn, q. v.). *Cornus Nuttalii* of N.W. America is a very handsome shrub. There are numerous other minor uses to which the species of C. are applied. See *Cornus*, in *Treas. of Botany*, and Blackie in *Canadian Naturalist*, 1860.

Corn Aphis (*Aphis granaria*), a species of aphides or plant-lice, so named from its habit of feeding on the ears of corn, wheat, and barley, and of thus destroying the grain. The male

of this insect is of a dull-green colour, the female of a yellowish hue.

Corna'ro, the name of a distinguished patrician family of Venice, members of which were more or less notable for four centuries.—**Marco C.**, celebrated for his eloquence, was elected Doge in 1368, and completed the conquest of Candia. His great-granddaughter, **Caterina C.**, born in 1454, married Jacques Lusignan, King of Cyprus, and after the death of her husband handed over the government of the island to her countrymen, and withdrew into private life. She died in 1510. But perhaps the most singular member of the family was **Lodovico C.**, born in 1467. He had so impaired a naturally feeble constitution by excess, that at forty death seemed inevitable. But by entirely changing his course of life, and adopting a regimen of rigid temperance and of judiciously-regulated exercise, he lived till about 100, dying in 1566 or 1569. When very old he published, in four successive parts, his *Discorsi della Vita Sobria* (Padua, 1558; new ed. Venice, 1866), which has been translated into many languages, and even into Latin. An English translation was published in 1779. Other Cornari who merit notice are **Giovanni I.**, Doge of Venice from 1625 to 1629; **Lucrezia Elena C. Piscopia** (died 1684), famous for her knowledge of classics, theology, and philosophy, and whose writings were edited by Bacchini (Parma, 1688); and **Giovanni II.**, elected Doge in 1709.

Corn Beetle (*Cucujus testaceus*), a genus of Beetles or Coleoptera (q. v.) of small size, the larvæ of which feed on wheat and other kinds of grain, and consequently do much harm in granaries.

Cornbrash, a group of rock formations belonging to the Bath or Lower Oolitic series, and averaging in Dorsetshire about 40 or 50 feet in thickness, whilst in Mid-England it is never more than 15 feet thick. It is a rubbly iron or ferruginous limestone, and lies in thin beds. It is full of fossils, the *Avicula echinata* (Lamellibranchiata) and *Nucleolites clunicularis* (Echinoderm) being the most typical forms.

Corn Bruiser, a machine for bruising oats and other grain for horses, cattle, sheep, and pigs, consisting of an iron frame, underneath which encased is a fluted barrel, the edges of whose grooves are sharp. These, when turned, press the corn against a resisting iron surface, and speedily bruise it to any form desired.

Corncrake. See CRAKE.

Cor'nea. See EYE.

Corneille', Pierre, the first great dramatist of France, was the son of an inspector of waters and forests, and was born at Rouen, June 6, 1606. He was educated by the Jesuits, and began business at the local bar. An incident in his own life suggested to him the plot of his first comedy, *Mélite*, which he wrote in 1625, and brought out in Paris when he came there, deserting the bar, in 1629. *Mélite*, and the plays which immediately followed it, such as *Clitandre*, *La Veuve*, &c., had a great run at both the Marais and the Hôtel de Bourgogne. They were marked by simplicity and neatness of style, impossible ingenuity of plot, and complete absence of humour, but they formed a pleasing contrast to the pedantic conceits of Scudéry and Viaud, and the rough melodrama which Hardy, Mairet, Tristan, Rotrou, and others manufactured, chiefly from Spanish materials. With some of the latter C. for a time co-operated at Richelieu's Palais-Cardinal, but quarrelling with his patron, he withdrew, and in 1635 produced his first tragedy, *Médée*, which was followed in 1636 by his masterpiece, *Le Cid*, founded on De Castro's play *Las Mocedades del Cid*. In Spain, however, the story of Campeador's love and conquests had taken the form of an historico-romantic pageant. C. treated the subject with originality, preserving unity of action, and centring the interest on the moral struggles of the principal actors. Its success was immense; *beau comme le Cid* becoming a popular proverb. Next came *Horace* (founded on Livy's story of the Horatii), *Cinna* (which develops Seneca's brief account of the conspiracy against Augustus by the grandson of Pompey, A.D. 4), and *Polyeucte*, a story of Christian conversion in Armenia during the persecution of Decius. In *Pompée*, C. has followed and improved upon a portion of the *Pharsalia* of Lucanus; while *Le Menteur* (1642), the most successful of his comedies, was based upon the plays of Lope de Vega and Alarcon, from the former of whom C.'s *Don Sanche d'Aragon* (1650) was also imitated. C. has been called the father of French tragedy, but his genius was very unequal, and among his later tragedies, *Œdipe* (1659) was the only striking success. His translation of the *Imitation of Christ* of À Kempis was much used by the Jesuits of the 17th c. C. died, after a peaceful domestic life, on the 1st October 1684. The most interesting edition of C. is that by Voltaire (12 vols. Par. 1762); the most complete, those by Renouard (12 vols. Par. 1817), Lefèvre (12 vols. Par. 1824), Didot (12 vols. Par. 1854-55), and Taschereau (Par. 7 vols. 1857-62). The most convenient is the select edition in 2 vols. (Par. 1856), having the Life of C. by Fontenelle prefixed, and some plays by C.'s brother, Thomas. See also the Lives of C. by Taschereau (Par. 1829; new ed. 1855), Levasseur (Par. 1843), and Guizot (Par. 1852).

Corne'lius, Peter von, founder of a recent German school of art, was born 16th September 1787, at Dusseldorf, of the picture gallery of which his father was inspector. He was carefully educated in art, and at the age of nineteen was employed to paint the cupola of the old church of Neuss with colossal figures in chiaroscuro, in which he displayed considerable grandeur of conception. In 1810 he removed to Frankfurt, where he executed a famous series of designs in illustration of Goethe's *Faust*, and in 1811 went to Rome, where, in alliance with his friends Overbeck, Schadow, Schnorr, and others, he devoted himself to the regeneration of German art, an object which he saw accomplished in his own day, and in great part through his own instrumentality. The young artists specially cultivated fresco-painting, and C.'s frescoes the 'Interpretation of the Dream' and the 'Recognition of the Brethren,' from the history of Joseph, won for him the favour of King Ludwig of Bavaria, and a commission to decorate the new Glyptothek at Munich. He left Rome in 1819, but his frescoes in the Glyptothek were not completed till 1830. They consist mainly of two series of designs—one, 'The Heroes,' illustrating the chief events of the Iliad; the other, 'The Gods,' the subjects for which were supplied by the Greek mythology. A 'Last Judgment' in the *Ludwigs Kirche*, Munich, 64 feet high and 30 wide, is remarkable at once for its size, its grandeur of conception, and the severity of its style. Other works are his designs in illustration of the *Nibelungenlied* and the *Gerusalemme Liberata* of Tasso, the frescoes in the corridors of the Pinakothek, Munich, illustrating the history of Christian art, and those of the Campo Santo, Berlin. His later years were spent chiefly in Berlin, where he died, 6th March 1867. See Riegel's *C. der Meister der Deutschen Malerie* (Hamb. 1866; 2d ed. 1870), and Von E. Förster's *Peter von C. ein Gedenkbuch aus seinem Leben und Wirken* (Berl. 1875).

Cornelius Ne'pos. See NEPOS.

Cor'nell Univer'sity, one of the most vigorous of the newly endowed colleges of the United States, was founded by Ezra Cornell in 1868, at a cost of about £152,000. It also received Government grants as a state agricultural college, amounting to 990,000 acres of land. C. U. is situated in Ithaca, a small town in the western part of New York state. The institution is undenominational, and aims at being *national*. The students to some extent combine industrial pursuits with study. Goldwin Smith, a brilliant English scholar and political critic, expatriated himself to become a professor here.—**Ezra Cornell**, founder of the university, was born at Westchester, New York, January 11, 1807, and received but a slender education—a circumstance which adds to the greatness of his generosity. Devoting himself to mechanical pursuits, he eventually became deeply interested in telegraph stock and Western land speculations, and acquired a large fortune. C. lives (1875) in Ithaca, to which town he has presented a valuable public library.

Cor'net, or **Cornet-a-Piston**, a brass wind instrument (with three pistons or valves) of the trumpet class. It is much used in military bands, and to some extent also in the orchestra, where it can generally play the trumpet parts.

Cornet (from the Span. *corneta*, 'a standard') was formerly the lowest rank of commissioned officer in the cavalry, equivalent to *ensign* in the infantry. The special duty of the C. was to carry the standard. He also assisted the captain in his daily military duties. The rank was abolished in 1871, that of sub-lieutenant taking its place.

Corne'to, a fortified town of Italy, province of Latium, on the left bank of the Marta, 4 miles from its mouth, and 11 N. of Civita Vecchia. It is built from the neighbouring ruins of the ancient Tarquinii—a place peculiarly interesting to the ethnological and antiquarian student, as the source of almost all our knowledge of Etruscan life and art. From its tombs many treasures have been removed to the British Museum. C. is the seat of a bishop, and has a Gothic cathedral of the 9th c., and a palace of the 15th c., now an inn. Pop. 4070.

Corn-Fly, a name applied generally to various flies or *Diptera*, from their habit of producing in the larval state much disease and injury in corn plants. The *Chlorops tæniopus* is a familiar example. It is of minute size, and coloured yellow with black stripes. The larvæ deposited in the young plants cause the swelling popularly known as the *gout*. The species of the genus *Oscinis* are also named 'corn-flies.'

Corn Ground-Beetle (*Zabrus gibbus*), a Pentamerous Coleopteran or beetle, the larvæ of which burrow in the ground and feed on the roots and stems of corn. The perfect insect is about half an inch in length, and is of a black colour. The beetle itself lives on the ears of corn, barley, &c. The larva is white with a brown head and chest, and possesses tufts of hair along the sides of the abdomen.

Cor'nice (Gr. *korōnis*, 'a curved line,' 'a flourish'), in classical architecture, the uppermost of the three members of an entablature—the architrave, the frieze, and the C. It is a horizontal moulded projection, and is characteristically distinguishable in each of the orders. In Gothic architecture, a plain face of parapet projecting slightly from the wall, with under it a row of blocks, sometimes plain, at other times variously ornamented, over which there is usually a row of small arches, frequently serves as a C. In the Decorated style, it chiefly consists of a slope above, then a deep sunk hollow, with beneath it an Astragal (q. v.). Several small mouldings often compose the C. in the Perpendicular style; but details of ornamentation exercised largely the fancy and ingenuity of workmen in all these later styles. See COLUMN, ENTABLATURE.

Corn-Laws. The early English statutes relating to the corn trade took the shape of general prohibitions to export except under royal licence, special prohibitions to export by royal proclamation, prohibitions to import or export, except as above, at certain prices. An Act of 1670 prohibited importation while home-corn was selling at less than 53s. 4d., and imposed a duty on the imports at a higher figure. A bounty was given during the 18th c. to the exporter, but in 1773 this was discontinued, exportation was prohibited except at prices below 44s., and importation was allowed above 48s. at a fixed duty of 6d. The figure at which importation was allowed was gradually raised to 80s. for wheat, 40s. for barley, and 26s. for oats; and in 1814 the sliding scale, in which the duties diminished as the price of importation rose, was introduced. The intention of this arrangement was the benevolent one of making the pressure of taxation lightest when corn was least plentiful. The result was to destroy the regularity of trade, and to make the people's food the subject of speculative and often ruinous contracts. The sliding scale not only hurt the import trade more than a fixed duty would have done, but it seriously affected domestic agriculture and manufactures. From 1821 to 1830 the annual average of British exports fell from forty-one to thirty-six millions. In 1840 agricultural wages simply meant starvation; in some districts estates were given up by the owners to the parish, because the poor-rates exceeded the rents. The system of protecting home agriculture was supported by many absurd arguments, inspired partly by the recollections of the French war, partly by the stupidity and selfishness of the landlord class. These arguments are still employed in the United States and in the Colonies; but although so late as 1852 Mr Disraeli declined to admit that the repeal of the C.-L. was 'wise, just, or beneficial,' they have been generally abandoned in this country. In truth, the interests of the landlord class happened to be the same as those of the great mass of the nation. The rise of rents has been caused by the growth of manufactures, which implies a vast additional demand for agricultural produce. Manufactures have further enormously increased the value of land by introducing a spirit of improvement, and stimulating mechanical invention. By protection, therefore, the landlords were destroying their own customers, and latterly also their own labourers. In 1834 and 1838 Mr Hume and Mr Villiers made gallant efforts at least to secure inquiry into the evil. In 1841 Lord Melbourne's Government proposed, in lieu of the sliding scale, a fixed duty of 8s. per quarter on wheat, 4s. 6d. on barley, 3s. 6d. on oats. The ministry were defeated, and Peel came in pledged to protection. In 1842 he introduced the modified sliding scale of 1s. per quarter. In the meantime the majority against Mr Villiers' annual motion for total repeal had sunk from 303 in 1842 to 132 in 1845. This was owing to the activity of the Anti-Corn-Law League, formed in 1839. It was only, however, under the pressure of the corn famine and potato-disease of 1845 and 1846, which produced very great distress, that Sir Robert Peel was able to carry, on 25th June 1846, his bill abolishing the corn-duties as at 1st February 1849, and in the meantime fixing the duty of 10s. per quarter when the price was 48s., to fall by 1s. with every rise of 1s. in price, till on reaching 53s. it was fixed at 4s. All colonial grain was admitted at once at a duty of 1s. The Free-trade majority consisted of 112 Conservatives and 227 Liberals. Corn-taxes were, however, not finally abolished in 1846. There remained a duty of 1s. per quarter, which was intended by Sir Robert Peel as a registration-duty, and was converted in 1863 by Mr Gladstone into a duty of 3d. per cwt. Its importance will be seen from the following table of its produce:—

	1864.	1865.	1866.	1867.	1868.	1869.
Corn-meal and flour,	£746,000	£562,000	£743,000	£797,000	£869,000	£897,000

It of course produced the largest revenue when the home harvest failed; it involved a collateral duty on arrowroot, potato-flour, sago, and other farinaceous substances, and it raised the price of home corn. Every one therefore applauded Mr Lowe when he abolished it on 12th April 1869, although in 1871 Mr Disraeli, who has always opposed remissions of indirect taxation, denounced this measure as a wanton sacrifice of revenue. We will now give a table showing the quantities of wheat and wheat-flour, barley, and oats imported into the United Kingdom at triennial periods from 1840 to 1870 inclusive, and for 1871 and 1872. It may be explained that from 1834 to 1843 the average *Gazette* price of British wheat was 56s. 3d. (the highest being 70s. 8d. in 1839, the lowest 39s. 4d. in 1835); from 1844 to 1853 the average was 49s. 4d. (the highest being 69s. 9d. in 1847, the lowest 38s. 6d. in 1851); from 1854 to 1863 the average was 56s. 11d. (the highest being 74s. 8d. in 1855, the lowest 43s. 9d. in 1859); from 1864 to 1873 the average was 52s. 8d. (the highest being 64s. 5d. in 1867, the lowest 40s. 2d. in 1864):—

	Wheat and Wheat-Flour.	Barley.	Oats.
	Cwts.	Cwts.	Cwts.
1840	10,560,290	2,333,707	1,487,024
1843	4,619,917	640,286	231,888
1846	10,195,930	1,324,432	2,170,682
1849	20,850,604	4,932,172	3,484,541
1852	18,092,627	2,234,071	2,720,539
1855	13,940,322	1,246,882	2,842,749
1858	23,200,941	5,933,543	5,104,773
1861	37,646,705	5,001,432	5,114,398
1864	28,837,203	4,921,362	5,562,959
1867	39,136,780	5,683,721	9,407,136
1870	36,906,115	7,217,327	10,830,630
1871	44,362,237	8,569,012	10,912,204
1872	47,612,896	15,046,566	11,537,325

The reflection which these figures suggest is not that the abolition of the C.-L. has greatly or permanently lowered the price of corn (although such was the tendency of the change, other conditions remaining equal), but that the abolition has, in connection with other fiscal changes, enormously increased the general production or purchasing power of the country, and has, in particular, placed the country almost beyond the reach of a famine, since the rise of a few shillings in the price of corn brings to the market millions of quarters from distant districts, which are kept by the expense of transit from ordinary competition. In fact, it is probable that, as a matter of economy, not of policy, Britain is now too entirely dependent on foreign supplies of grain. A committee of the House of Lords, appointed in 1873, reported that out of 20,000,000 acres requiring drainage, only 3,000,000 are as yet drained. It must be kept in view that while corn tends to rise in cost of production with the

increase of population, and to fall with every improvement in agriculture, there is a necessary limit to this, because an increase in the cost of producing corn means a diminished return on the industry employed in producing it; and this diminished return —corn being the principal article of the labourer's consumption —involves for him diminished means of support. This explains the singular fact that, allowing for depreciation of money, the normal price of wheat has not risen in England since the beginning of the 17th c.

Corn-Moth (*Tinea granella*), a species of moth belonging to the genus *Tinea*, which also includes the Clothes Moths (q. v.). Its larva is known as the 'C. worm,' and destroys grain stored in granaries. The moth itself is of a yellowish-white colour, the front wings being variegated with grey, brown, and black colours. The larvæ also attack books, pasteboard, and similar substances. The *Butalis cerealia* is another moth also known by the name of C.-M. It inhabits America, and has been met with on the continent of Europe, but does not occur in Britain.

Corns are generally produced by tight boots or shoes, and consist of hard portions of the cuticle, the result of alternate pressure and freedom. They are generally described as *hard C.* and *soft C.* The latter are situated generally between the toes, and are kept moist by the natural secretion of the toes; the former are situated on exposed parts. C. are very painful, and are more easily prevented than cured. Boots and shoes should never be tight, but should always be large enough to contain the foot easy. For *hard C.* the best treatment is carefully to remove with a knife the hardened part of the skin, and then apply some substance which will dissolve the C., as glacial acetic acid. *Soft C.* are best treated with strong nitric acid.

Corn Salad, or Lamb's Lettuce (*Fedia* or *Valerianella*), a genus of plants belonging to the natural order *Valerianaceæ*, common in Britain and on the continent of Europe. The common C. S. (*V. olitoria*) is often cultivated as a salad, more because it is in perfection early in spring, than because of its taste, which is insipid. *V. carinata* (the vineyard salad) and *V. eriocarpa* (the Italian C. S.) are also similarly used on the Continent.

Corn Sawfly (*Cephus pygmæus*), a species of Sawflies (q. v.), the females of which, by means of their peculiar Ovipositors (q. v.), insert the eggs in or near the ears of wheat and other cereals. The larva consumes the substance of the grain, and passes its chrysalis stage in the stem. This fly is about half an inch long, and of a black colour with yellow marks.

Cornstone is an arenaceous limestone, in which, however, there is a predominance of calcareous matter. It is a grade in the passage from calcareous sandstone to a good limestone, and its weathered surfaces are frequently of a dark brown colour, due to the presence of peroxide of iron.

Corn Thrips (*Thrips cerealium*), a genus of insects variously regarded as belonging to the *Orthoptera* (q. v.) and included in a special group, *Physopoda*. The C. T. does great injury to wheat crops, both by eating the ears and stems of the plants. The tarsi consist of two joints, and the foot is sucker-like. The colour is black. The males are wingless, the females have four wings.

Cornuco'pia (Lat. *cornucopiæ*, 'the horn of plenty'), in classical mythology, the horn of the goat Amalthea, who suckled the infant Jove, and which he afterwards through gratitude raised to be a star, is now referred to as the emblem of fruitfulness and abundance. In architecture and heraldry the word denotes an ornament representing a horn, from which issue flowers, fruits, corn, &c. The C. is frequently found on ancient coins, especially those of Sicily.

Corn'wall, an English county, forming the S.W. extremity of Great Britain, bounded on all sides by the sea, except on the E., where it is separated from Devonshire by the Tamar. In form it somewhat resembles a right-angled triangle. Area, 1359 sq. miles; pop. (1871) 362,343. On the side stretching from N.E. to S.W. are numerous shallow bays, of which the principal is that of St Ives, while Trevose Head is the most commanding promontory. The S. coast has much deeper indentations and bolder promontories. Among the former are the harbours of Plymouth and Falmouth and Mount's Bay, and among the latter are Lizard Point and Land's End, off which are the Scilly Isles (q. v.). Through the centre of the county from N.E. to S.W. extends the S.W. continuation of the Devonian range of hills, forming the principal watershed, and from which the land slopes seaward on each side. The grey granite occurring in this range is rapidly decomposed when exposed to the air, and has formed valuable beds of kaolin, or porcelain clay, largely used in the manufacture of the finer kinds of ware. The old red sandstone strata occupy about three-fourths of C. The hills nowhere rise much above 1300 feet, and the rivers, numerous but short, are accessible to the tide, and their mouths form valuable harbours. The principal river, the Tamar, has a course of 56 miles. The climate is mild but variable, with frequent rain, from the almost insular situation of the county. The soil in the elevated districts is almost barren; on the coast and in the valleys it is comparatively fertile, but to produce abundantly it requires to be heavily manured. A favourite crop is potatoes, for raising which the soil is so well adapted that in some places two crops are produced in the year. The total area under crop in bare fallow and grass in 1875 was 525,017 acres. Of these there were under corn crops 145,953 acres; under green crops, 60,042 acres; under clover and grasses in rotation, 135,932 acres; and under permanent pasture, exclusive of heath and mountain land, 162,873 acres. The principal corn crops are wheat, barley, and oats; green crops, turnips, mangold-wurzel, and potatoes. There are 26,374 acres of woods and coppices. In 1875 the number of cattle in C. was 156,915; of sheep, 438,925; and of horses, 29,780. The fisheries of C. are of great extent and importance; the distinctive kinds of fish being mackerel and pilchard, the latter of which are exported in vast quantities, and the take is sometimes so great that they are sold for manure. But its mineral wealth is what mainly distinguishes the county. In 1870 there were raised 11,214 tons of iron ore; 56,526 tons of copper ore from seventy-seven mines, from which 4148 tons of fine copper were obtained; 8481 tons of lead ore from twenty mines, from which 6360 tons of lead were obtained; and 292,045 ounces of silver, and 15,190 tons of tin ore, from which were obtained about 10,200 tons of tin.

C. is the *Cassiterides* ('tin islands') of the Phœnicians, who traded for tin with C. and the Scilly Isles, and probably formed the word from the Sanskrit *Kastira*, much tin being found in the islands off the coasts of India (Lassen, in Ritter's *Erdkunde*). At the time of the Roman invasion C. was inhabited by the *Damnonii* and *Cornabii*, from the latter of whom its name was Latinised into *Cornubia*. The English invaders called the people *Corn-wealhas* ('the strangers of the "Corn" or "horn" (Wel. *Kernou*) of the island'), whence the modern C. The county is rich in British and Roman antiquities, stone-circles, sepulchral tumuli, remains of camps, amphitheatres, &c.; and has besides some singular natural curiosities, of which the most notable are the Logan stones and Cheesewring. From its remote position, C. was naturally the last part of the S. of England to yield to the English, nor was it finally conquered by them till the reign of Æthelstan, in the 10th c. In 1329 C. was raised to a duchy, which is hereditary in the Princes of Wales. In the Wars of the Roses the Cornish men were Lancastrians; in the civil war they were Royalists. A Cymric dialect (see CYMRIC LANGUAGE AND LITERATURE) continued to be spoken down to the middle of the 18th c., and has given some words to the English tongue.

Cornwall'is, Charles, Marquis, an English general and governor, son of the first Earl Cornwallis, was born December 31, 1738, and was educated at Eton and Cambridge. After serving in the Seven Years' War, and holding several appointments, including that of Governor of the Tower of London, he was sent to the United States to command against the colonists in the War of Independence. He gained some successes over the American troops in 1780 and 1781, but was compelled to surrender, with all his troops, at York Town in Virginia. Although this disaster precipitated the ruin of the British cause in America, C. was not censured when he returned to England, but, from 1786 to 1793, held the office of Governor-General in India and commander-in-chief of the troops there, signalising his term of office by crushing Tippoo Saib, and by a series of administrative reforms which have conferred on him a still more lasting renown. To C. is owing the famous 'permanent settlement' of the land-question in Bengal and Behar, by which the zemin-

dars were invested with a permanent tenure of the land at a fixed and unalterable assessment. He also introduced great changes into the judicial system of the Bengal Presidency, confining the collector of revenue to his fiscal duties, and establishing a civil court in each district, with a judge, a registrar, and one or more 'covenanted' assistants. Returning to England, he was raised to the rank of marquis. The position he next obtained was that of Lord-Lieutenant of Ireland, and during his occupancy of it he succeeded in putting down the Irish Rebellion of 1798. After this he negotiated the Treaty of Amiens (1802) with France. Appointed a second time, in 1804, Governor-General of India, C. died at Ghazipore, in the division of Benares, in the same year (5th October). He was an able, honest, industrious ruler, and a general of superior capacity. See his *Correspondence* by Ross (3 vols. 2d ed. 1859).

Corn Weevil (*Calandra granaria*), a genus of beetles belonging to the Tetramerous group of *Rhynchophora*, in which the tarsi are four-jointed, and the head prolonged to form a *rostrum* or beak. This beetle is about a quarter of an inch in length. It is of a dark-red colour. The front wings or wing-cases are alone present. The larva feeds on the corn grains, and the eggs deposited by the female insects are usually very numerous. The remedy for the attack of these insects is to frequently stir and shift the grain. The rice weevil (*C. oryzæ*) feeds on rice; whilst the larva of *C. palmarum* of S. America lives in the stems of palms.

Coroll'a ('a little garland or crown'), the innermost or second floral envelope which in a perfect flower intervenes between the calyx and the stamens. In Monocotyledons it is believed to be wanting, as well as frequently in the *Apetalæ* or *Monochlamydeæ* of Dicotyledons. The pieces of which it is made up are modified leaves, and are called petals. They may be either wholly or in part united (*Gamopetalous* or *Monopetalous*), or entirely separate from one another (*Dialypetalous*, *Polypetalous*). The shape of the C. has given rise to various descriptive terms, such as bell-shaped, salver-shaped, rosaceous, &c., and according as the petals are all of the same size, or of different sizes, *regular* or *irregular*. The C. may have also appendages in the form of *scales*, *spurs*, &c., or those vaguely-defined glandular or other appendages at the base called *nectaries*. Each petal consists of the *limb* or blade, and the *unguis* or claw, the former corresponding to the blade of a Leaf (q. v.), the latter to the petiole or stalk, and, like the petiole of a leaf, may be present or absent, long or short. The shape of the C. generally determines the form of the flower, and as it is usually the most brightly coloured part, the beauty of the flower is also to a great extent dependent on it. See CALYX and PERIANTH.

Cor'ollary, in mathematics, is an immediate deduction from a demonstrated proposition, and many of Euclid's propositions might be proved as corollaries of some foregoing proposition.

Corollifloʹræ, a subdivision of Dicotyledonous plants, in which the stamens are usually inserted (or seem to be inserted) in the corolla, and in which the Corolla (q. v.) is gamopetalous, and inserted below the ovary. The heaths, *Labiatæ*, &c., are examples.

Coroman'del, a peninsula in the N. island of New Zealand, 30 miles E. of the town of Auckland. It is traversed by a rocky range of hills in which gold is found, and has been worked for a number of years. The yield is fluctuating, but has reached 16,000 oz., worth £50,000, in a year. Kapanga, the principal township, is a thriving little place.

Coromandel Coast (Ind. *Chola Mandalam*, *i.e.*, 'the land of Chola,' an ancient ruler of the region) is the name of the E. shore of the Indian peninsula, province of Madras, from Calymere (*Kalamari*) Point to the mouth of the Kistna, or from about lat. 10° 17′ to 15° 20′ N. The coast, from the shallowness of the water and the violence of the N.E. monsoon, is so dangerous that ships of any considerable size are obliged to anchor several miles from shore, and debarkation is effected by means of native boats.

Coromandel Wood. See CALAMANDER WOOD.

Coro'na, or **Crown**, in botany, a rather indefinite term, usually applied to any appendage that intervenes between the corolla and the stamens, as the cup of a daffodil, or the rays of a passion-flower. Various forms of C. may also be seen in *Stapelia* and other genera of *Asclepiadaceæ*, in *Silene pendula*, and various *Coryophyllaceæ*, &c.

Corona, in classical architecture, the lower member, or drip, of the projecting part of the Cornice (q. v.). In the language of ecclesiastical writers, the apse of a church is called the C.—as 'Becket's Crown' in Canterbury; so also is a large circle containing tapers which depends from the roof of a church, or in some cases stands on the floor.

Corona Borea'lis, a northern constellation between Hercules and Bootes, with one bright star of the second magnitude.

Cor'onach, properly *Coranaich* (Gael. *Co-ranaich*, 'roaring or howling together'), a term now applied almost exclusively to a wild lament, consisting partly of inarticulate wailing, with which the Irish and the Scottish Highlanders gave expression to their sorrow for the death of a friend. It was chanted, like the Latin *ululatus*, over the dead body, but the custom is now abandoned. The word C. has long been familiar to the Lowland literature of Scotland—*e.g.*,

> 'Cryand for you the cairfull *corrinoch*.'—Lyndsay.
> 'Be he the *correnoch* had done shout.'—Dunbar.
> 'The *cronach's* cried on Bennachie.'—Scott, *Antiquary*.

It is now passing into English. Thus Tennyson, speaking of the wild-swan's death-song—

> ——'The coronach stole
> Sometimes afar and sometimes anear.'

Corona'tion. The ceremony of C., and the use of the crown as an emblem of sovereignty, are of great antiquity. From the Bible we learn that Solomon and Ahaziah were crowned. Among the Greeks a kind of crown was awarded to the victors in public games; and to citizens of especial merit, C., with substantial privileges, was a frequent reward of valour among the ancient Romans—

> 'Thence let them ride in purple,
> With joyous trumpet sound,
> Each mounted on his war-horse,
> And each with olive crowned.'

In Westminster Abbey, against the altar-screen, stand the two C.-chairs of the sovereigns of England. One, the king's chair, covers the 'Stone of Destiny,' carried off from Scone, in Scotland, by Edward I., in 1296. The other, the consort's chair, was constructed for the C. of Mary, wife of William III. Both are still used at coronations. In the Cottonian MSS. is a copy of the Gospels, believed to be that on which the Saxon kings were sworn. (See CROWN.) Consult *Chapters on Coronations* (Lond. 1838), and Bohn's *Cyclopædia of Political Knowledge*.

Coronation Gulf, Arctic Ocean, into which the Coppermine River debouches, and studded with numerous islands. Lat. 66°–68° N., long. 108°–116° W.

Coronation Oath. Previous to the Revolution of 1688 the form of this oath was variable. At least, if there was a regular form, it was liable to be tampered with, a copy of the oath taken by Henry VIII. being in the Cottonian MSS. with alterations in his own writing. The present form of C. O. was fixed by a statute of William and Mary, which form was afterwards altered to suit the terms of the Union between England and Scotland, and Great Britain and Ireland. The sovereign swears to 'maintain the laws of God, the true profession of the gospel, and the Protestant reformed religion established by law,' also to 'maintain and preserve inviolably the settlement of the united Church of England and Ireland, and the doctrine, worship, discipline, and government thereof, as by law established, within England and Ireland, and the territories thereunto belonging;' also to 'preserve to the bishops and clergy of England and Ireland, and to the churches there committed to their charge, all such rights and privileges as do or shall appertain unto them.'

The security of the Church of Scotland is provided for by a passage in an Act of Parliament ratifying the Treaty of Union. It is thereby enacted that 'after the decease of her present Majesty (whom God long preserve), the sovereign succeeding to her in the royal government of this kingdom shall in all time coming (not at the coronation), *at his or her accession to the crown, swear and subscribe* that they shall maintain and preserve the foresaid settlement of the true Protestant religion, with the government, discipline, and worship of this Church, as above

established,' that is, as established by Act 1 Will. and Mary, c. 5. The C. O. is to be regarded as the ratification by the sovereign of a compact with Parliament, the terms of which compact may be altered at the will of the contracting parties.

Cor'oner (lit. 'a *crown*-officer'). In England the C. is an officer possessing both judicial and ministerial authority. In his judicial capacity he holds inquisitions in cases of violent deaths. It is part of his duty to inquire after and take care of treasure-trove, wreck of the sea, &c. The C. acts ministerially in the execution of writs of the crown when the sheriff is disqualified. Coroners are chosen for life by the freeholders, but they are removable for incapacity or misbehaviour. The number for each county is not fixed. In some counties there are six, in some there are four, and in others fewer. Their districts, and the time and manner of electing to the office, are regulated by an early statute of the present reign, amended by 23 and 24 Vict. c. 116. The court of a C. is a *close court* for the purpose of the inquisition, and he may exclude any one who is present merely as a spectator or reporter. A newspaper statement of an inquisition, accompanied with comments, is, it seems, libellous, although the report be strictly true. The C. may order the disinterment of a corpse. It is an indictable offence to bury a body liable to inquest without sending for the C. The office does not now exist in Scotland, but it is said to have existed.

Cor'onet. See CROWN.

Cor'poral (Fr. *caporale*, Ital. *caporale*, from *capo* (Lat. *caput*), 'the head') is in the British army the rank immediately below that of a non-commissioned officer. The special function of the C. is to maintain discipline among the private soldiers in barracks or in camp. The pay of a C. is from 1s. 3d. to 2s. 5d. per day. He has an assistant called a lance-C., who receives no extra pay. In the navy, there is a ship's-C., who is under the Master-at-Arms (q. v.). See COMMISSION, ARMY.

Corporal (Lat. *corpus*, 'the body'), a linen cloth placed over the consecrated bread and wine after the celebration of the Lord's supper. In England the term is applied also to the linen cloth, or rather, according to old usage, two cloths, spread on the altar while the sacrament is being consecrated. This cloth is also called *palla*, *Chrismale*, *anti-mensia*, *sindon*, *thronus*.

Corporal Punishment. See FLOGGING.

Cor'pora Lu'tea, a name given to peculiar appearances seen in the ovary after the extrusion of an ovum from a Graafian vesicle. See OVARY.

Corpora'tion is a legally fictitious person or body politic, created by royal charter, under special or general Act of Parliament, or prescription. It holds its property, rights, and immunities in perpetuity. A C. or body corporate may be either *lay* or *ecclesiastical*. In an ecclesiastical C. the members are the holders of spiritual office; and the object of such corporations is mainly the holding of ecclesiastical property. *Lay* corporations are either civil or eleemosynary, the former are established for the government of towns, for public improvements, or for the advancement of commerce and learning. Eleemosynary corporations exist for the administration of funds devoted to charitable or educational purposes. Corporations are either *sole* or *aggregate*, that is, of one, or of more than one. The Queen or a bishop is a C. *sole*. Corporations *aggregate* are commonly the Mayor (q. v.) (in Scotland, the Provost, q. v.) and burgesses of a town, the head and fellows of a college, the dean and chapter of a cathedral church. A name is essential to every C. The powers usually bestowed on corporate bodies are,—to have by descent, election, or otherwise, perpetual succession, to sue and be sued in their corporate capacity, to purchase lands and have a common seal, to make byelaws for the better government of the C. But they can make no byelaws contrary to the laws of the country. A C. cannot commit felony or treason. It can only appear in legal proceedings by attorney or other officers authorised to act for it.

Under recent Acts of Parliament any society of persons having a legal purpose may acquire the character of a C. See BENEFIT FRIENDLY SOCIETIES, BUILDING (BENEFIT) SOCIETIES, JOINT-STOCK COMPANIES, PARTNERSHIP. See also MUNICIPALITY, BURGESS ROLL, TOWN COUNCIL.

Corps d'Armée, a term formerly confined to the organisation of the military forces of the more powerful nations of Continental Europe in times of peace. Each C. d'A., consisting usually of not less than 50,000 men, had the staff, artillery park, and all the equipments of a complete army. The term is now generally used, in England, as elsewhere, for the largest division of an army in the field, which is subdivided into brigades, and these into regiments and battalions.

Cor'pus Callo'sum. See CEREBRUM.

Cor'pus Chris'ti, or Benet College, Cambridge, was founded in 1352 by the two united guilds of C. C. and of the Blessed Virgin. Archbishop Parker increased the endowments of the college, and left to it his manuscripts, including the only authentic manuscript copies of the Thirty-Nine Articles. There are twelve fellows, who must all take holy orders. The scholarships are numerous, and some of them are valuable. In 1875 the number of undergraduates was 144.

Corpus Christi, Oxford, founded in 1516 by Richard Fox, Bishop of Winchester, was at first characterised by stringent discipline, and was the first foundation in which Greek was made imperative in an academic course. It now consists of a president, 20 fellows, 24 scholars, and 2 chaplains. The fellowships, two of which are annexed to professors, are of the annual value of about £200, and the scholarships, tenable for five years, of the annual value of £80. Exhibitions, to be competed for by the commoners, have been lately instituted. In 1875 the number of undergraduates was 59.

Cor'pus Chris'ti Fes'tival, a festival called in France the *Fête Dieu*, the most splendid in the Roman Catholic Church, was instituted by Pope Urban IV. in 1264 in honour of the consecrated host, and ordered to be kept on Thursday after the festival of the Trinity, otherwise called the Octave of Pentecost. Grand processions are its chief features.

Cor'pus Delic'ti, a Scotch criminal law-term denoting the leading fact specified in a criminal charge. Thus, if a person be charged with murder, it must be proved that there has been a murder, otherwise C. D. is not established. See CIRCUMSTANTIAL EVIDENCE, EVIDENCE.

Corr'ea, a genus of Rutaceous shrubs, natives of Southern and Eastern Australia, where they are known as 'native fuchsias.' The leaves of some of them are used as a substitute for tea.

Correc'tion, House of. See PRISON, REFORMATORY.

Correction of the Press. The functionary of a printing establishment whose business is to detect and correct the errors of the compositor is called the 'Reader.' To be a good *reader* requires more natural aptitude and more practice than the uninitiated would expect. Besides the errors of the compositor, there are certain kinds of errors of the author which must be looked to—faulty spelling or punctuation, misquotation, &c. The form or scheme of a work, that is, the arrangement of chapters, paragraphs, notes, or tabular matter, is also more or less troublesome. After the reader's revision, the writer or author usually revises. An author should write his work as legibly as his skill in penmanship enables him to do. He should then revise and correct with the utmost care. In his *proof*, if he be particular regarding his composition, he will surely, despite his own care and that of the reader, find many blunders. If he wish to save expense, corrections should be made so as to cause as little derangement of space as possible. The author should revise a second proof, to see that the corrections made in the first have been carried out. There should be no fresh corrections in a second proof, if the author has been duly careful; but the fastidious writer will probably find that correction is an endless task.

Besides familiarity with typography, a good reader must have an eye to note each word and letter, while at the same time he takes in the meaning and connection of the whole. In printing a volume it is usual to correct one sheet at a time, but sometimes it is more convenient to take a proof on long slips before dividing into pages. Corrections are marked on the margin by established signs understood by all printers; but it is not necessary that the author should use these signs in correcting. He should mark the margin where a change or correction is to be made, write very legibly, and be careful to avoid confusion.

Correg'gio, an old town in the province of Reggio, N. Italy, in the Val de Molini, 12 miles to the S. of the Po, and 5 E. of Carpi, a station on the Mantua and Modena Railway. It has a fine cathedral and a rare old castle, was formerly a barony of the princely family of C., but is best known as the birthplace of the great colourist, Antonio Allegri, who hence derives his famous surname. Pop. 11,693.

Correg'gio, Anto'nio Alle'gri, derives his surname from Correggio, a town in Modena, near which he was born in 1494. To this great painter history has been unkind. His career and condition in life were at first misrepresented and encrusted with unfounded tradition by his contemporary Vasari; and recent investigation has but tended to overthrow traditionary evidence without replacing it with much of verified fact. Vasari's narrative has been proved to be fabulous with respect to most of his statements, and all the traditionary matter in connection with the name of C., including the famous *Anch' io sono pittore* ('I also am a painter'), is now regarded as without foundation. The facts recently established concerning him are few. His father, Pellegrini Allegri, was a merchant of Correggio in good circumstances; his mother was Bernardina Piazzoli of the Aromani family. C. commenced to paint in boyhood, but from whom he received tuition is unknown. He removed to Mantua in 1511, and there spent some time studying the works of Mantegna, an artist of fair ability. He returned to Correggio in 1514, and in that year he produced his first authenticated picture, 'The Madonna with St Francis,' a work admirable in composition and expression. In 1518 he was invited to Parma, and there he painted the frescoes in the convent of San Paolo and many pictures. He fell heir to all his uncle's property in 1519, and in the same year married Girolama Merlini, who brought him a small dowry. After residing for a number of years in Parma, where his wife is supposed to have died about 1528, C. returned to his native town, and died there, March 5, 1534, aged forty. His pictures are characterised by perfect chiaroscuro, luscious and splendid colour, and a bright and joyous grace of style. There seems to have been perpetual sunshine in his mind. His children, round and plump of limb, roguish in expression, and perfectly graceful and beautiful in drawing, are beyond criticism. The Carracci were overwhelmed and delighted with the loveliness of his Madonnas and his children, and studied his works to good purpose; while Titian is reported to have said if he 'were not Titian he should wish to be C.' In modern times Sir Joshua Reynolds studied him with a too slavish assiduity, and in the luminous eyes of his cherub faces we see the design and the expression of the old master. C. was the father of Reynolds' children. Among the great works of C. are the 'School of Love,' and the 'Ecce Homo,' in the National Gallery, London; the 'Madonna Enthroned,' 'La Notte,' the 'Holy Night,' and the 'Madonna in Glory,' in the Dresden Gallery; the 'Sleeping Venus,' and the 'Mystic Marriage of St Catherine,' in the Louvre; the 'Vine Arbour,' the two 'Angelic Choirs,' and the 'Madonna della Scodilla,' or the 'Rest after the Flight into Egypt,' in Parma. See *A. A. la C.*, from the German of Dr Julius Meyer, edited by Mrs Heaton (Macmillan, 1876), and the splendid volume, *The Works of C. at Parma*, reproduced in photography from the engravings of Paolo Toschi, with biographical and descriptive notices by Louis Fagan, Prints Department, British Museum.

Correg'idor, the chief magistrate of a Spanish town, appointed by the king. In Portugal, the name is nearly synonymous with our *judge*, an administrator of justice.

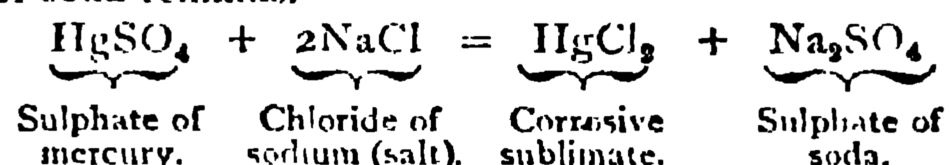
Corrèze', a mountainous department of Central France, part of the old province of Limousin, and traversed by the river C., from which it takes its name. Area, 2265 sq. miles; pop. (1872) 302,746. It is in part richly wooded, though barren in the higher districts. Its rivers are the C., the Dordogne, and the Vezère. C. has considerable mineral riches, but the inhabitants are chiefly engaged in agriculture, the manufactures being almost confined to the making of firearms at Tulle. The department is divided into the arrondissements of Tulle, Brine, and Ussel.

Corr'ib, Lough, a lake in the county of Galway, Ireland, next in size to Lough Neagh, being 27 miles long and from 2 to 6 broad, with an area of 68 sq. miles. C. is only a few feet elevated above the sea-level. It has numerous small islands, with some fine ruins; and its northern and western shores are remarkable for their beautiful scenery. Through subterranean channels it receives the waters of Lough Mask, and discharges its own superfluous waters into Galway Bay, 3 miles distant.

Corr'idor (Span. *corredor*, 'a runner,' from *correr*, Lat. *currere*, 'to run'), in architecture, a gallery, or open communication to the different apartments of a house or public building, each of which has a door opening into it.

Corrien'tes (Span. *corrientes*, Lat. *currentes*, 'currents, rapids'), the name of a province, and of its capital, in the Argentine Republic, S. America.—The *capital*, at the confluence of the rivers Parana and Paraguay, is a well-built town, and possesses admirable facilities for inland and foreign commerce. It has a fine church (San Francisco), and a natural history museum, of which Bonpland (q. v.) was director from 1854 till his death. The harbour is good, and the town has an important trade in timber. Pop. (1869) 11,218.—The *province* embraces the northern portion of the peninsula formed by the rivers Parana and Uruguay, the southern portion being occupied by the province of Entre Rios. The greater part of the surface is low and swampy, but the S. and E. are hilly. Cotton, tobacco, rice, sugar, indigo, maize, barley, arrowroot, sweet potatoes, and various tropical fruits are raised. Area, 22,402 sq. miles; pop. (1869) 129,023.

Corro'sive Sub'limate is a compound of chlorine and mercury or quicksilver, the composition of which is represented by the formula $HgCl_2$, and is called by chemists bichloride of mercury, or mercuric chloride. C. S. is prepared by heating a mixture of 2½ parts of mercuric sulphate (obtained by the action of sulphuric acid on mercury) with 1 part of common salt in a subliming apparatus. C. S. rises in vapour, and condenses in needle-shaped crystals in the cool part of the vessel, whilst sulphate of soda remains.



$$\underbrace{HgSO_4}_{\text{Sulphate of mercury.}} + \underbrace{2NaCl}_{\text{Chloride of sodium (salt).}} = \underbrace{HgCl_2}_{\text{Corrosive sublimate.}} + \underbrace{Na_2SO_4}_{\text{Sulphate of soda.}}$$

C. S. is a colourless crystalline body much more readily soluble in boiling than in cold water; it dissolves also with ease in alcohol or ether. It differs from mercurous chloride or calomel (Hg_2Cl_2), not only in chemical composition, but also in its physiological action, it being a most deadly poison, even if swallowed in small quantities. The best antidote is white of egg. C. S. is a preservative, and has been used in embalming.

Corr'ugated Iron is made by passing thin sheet-iron between revolving fluted rollers, so arranged that each projection upon one roller coincides with a hollow upon the other. The iron thus corrugated is dipped into a bath of molten zinc, and so covered with a thin coating of that metal, or, as it is called, galvanised. The corrugations add very greatly to the strength of the iron, and enable it to be used for walls and roofs in places where as mere sheet-iron it would be impossible to employ it. The zinc is used to prevent rust, which, if it be once allowed to commence, very rapidly eats away thin iron plates. A good coating of oil-paint, renewed at intervals, helps very much also to prevent the destruction of the iron from the same cause.

Corr'upt Per'jury. See PERJURY.

Corrup'tion of Blood. See ATTAINDER, TREASON.

Corryvrech'an, or **Corrievrek'in** (Gael. 'Brecan's cauldron'), a strait between the islands of Scarba and Jura, Argyleshire, Scotland. The tides—running sometimes 13 miles an hour—round a pyramidal rock which rises with a rapid slope from a great depth to within a few fathoms of the surface, cause a whirlpool very dangerous to small vessels in stormy weather and at flood-tide. The name was first applied to another whirlpool in the sound between Rathlin Island and the coast of Antrim, and was probably transferred to the Scotch locality by the monks of Iona. See Joyce's *Irish Names and Places*, Second Series, pp. 408-410 (Dubl. 1875).

Cor'sac, the name given to some species of dogs or *Canidæ*, the best known being the *Cynalopex C.*, found in Hindostan and in Central Asia. The body and head are fox-like, the ears long and pointed, the tail bushy, and the limbs slender. It is gregarious in habits, and lives in burrows, feeding on small mammals, birds, and even insects.

Cor'sair (Span. *corsario*, from the Lat. *cursor*, 'a runner,' *i.e.*, one who scours the sea), a term applied in the S. of Europe to a pirate or his ship from the N. of Africa. The corsairs of Barbary were privateers rather than pirates, being commissioned by their princes to prey upon the ships of countries with which they were at war.

Cor'sica ('the woody'), an island in the Mediterranean belonging to France, and forming the department of *Corse*; area, 3378 sq. miles; pop. (1872) 258,507. A mountain chain traverses the interior from N. to S., the culminating point of which, Monte Rotondo, has a height of 9068 feet. Other summits exceed 7000 feet, and for the greater part of the year they are covered with snow. C. is watered by numerous small streams, of which the chief are the Golo and the Tavignano. The mountains are extensively covered with forests of oak, pine, cork, larch, and chestnut, or afford excellent pasture. The valleys and plains yield the ordinary cereals in abundance, fruit is largely raised, and the less elevated slopes are clad with vines. Corsican wine has, however, never had a high character. One of the principal industries is fishing—tunny, pilchard, and sardines abounding along the coast. The mineral wealth of the island, which is considerable, has not been much developed. C. has many fine natural harbours on its W. coast. The capital is Ajaccio, Sartene and Copte being next in importance. The Corsicans are in speech and character Italian. The Vendetta (q. v.) is one of the most notable of Corsican institutions.
The original inhabitants of the island were of the Ligurian stock. After the conquest of the seaboard by the Etruscans, a considerable trade was developed. At a later period the Carthaginians became masters of C., but were forced to surrender it to the Romans after the close of the first Punic War (3d c. B.C.). Roman colonies were established here by Marius and Sulla, and under the Empire it was extremely prosperous, possessing thirty-three cities. It suffered severely from the devastations of the Vandals, and was successively subject to the Greeks, Goths, Longobards, Franks, and Saracens. About the 11th c. it passed under the dominion of the Pisans, and, after repeatedly changing its rulers, became a possession of France in 1768. See Filippini's *Historia di C.* (1594), with continuation by Gregory to 1769 (Pisa, 1828-32); Gregorovius's *Wanderings in C.* (2 vols. Stuttg. 1854; Eng. transl. by Muir. Edinb. 1855); and Galetti's *Histoire Illustrée de la Corse* (Par. 1863).

Corsican Moss, a name applied to *Gracilaria* (*Plocaria*) *Helminthocorton*, a species of seaweed which has been used as a vermifuge, though it is dubious whether its virtues have not been over-estimated. According to Mr Berkley, *Laurencia obtusa*, another seaweed, forms the greater part of what is sold in the shops as C. M.

Cor'slet (Fr. *corselet*, dim. of *corps*, 'the body'), a cuirass, or leathern piece of defensive armour formerly worn by pikemen. It was considered pistol-proof. In entomology the term is applied to that part—otherwise called the *thorax*—of a winged insect's body to which the wings and legs are attached.

Cor'sned was a piece of bread, or sometimes cheese, used in early times in England in a form of trial by Ordeal (q. v.). Blackstone says it 'was consecrated with a form of exorcism, desiring of the Almighty that it might cause convulsions and paleness, and find no passage, if the man was really guilty, but might turn to health and nourishment if he was innocent.'

Cor'so (Ital. 'running' and 'racecourse,' from Lat. *cursus*), applied to the running of horses without riders; to the procession in ranks through the principal street of an Italian town, especially at the Carnival; and to the street through which the race or procession is wont to pass. Hence many streets in Italy are named C., the most famous of which is the C. at Rome, 3500 paces long, from the Porta del Popolo to the foot of the Capitol.

Cort, Corne'lis, a famous Dutch designer and engraver, born at Horn, 1536, and after studying his art in Holland, went to Venice, was received into the house of Titian, and executed copperplate engravings of a number of the works of that master. Later C. removed to Rome, where he founded a famous school of engraving, and where he died in 1578. His works are chiefly remarkable for accuracy of design and refinement. He worked with rapidity, and executed in all over 150 plates.

Cortes' (Span.) from *corte* (*curia*), *i.e.*, a court or residence, is in Spain (q. v.) and Portugal (q. v.) the name given to the Legislative Assembly, or House of Representatives.

Cortes (or **Cortez**) **Fernan'do**, or **Hermando**, a Spanish *conquistador*, was born at Medellin, in Estremadura, in 1485. After a short stay at Salamanca, and a turbulent and licentious youth, he joined the expedition of Ovando to Hayti in 1504, where he obtained an estate, and amused himself by fighting with the natives till 1511, when he rendered important help to Velasquez in the conquest of Cuba. Here also he practised agriculture, and wrought gold with the *repartimiento* of Indians then commonly assigned to the conquering strangers. In 1518 C. took the command of the *Armada* fitted out by Velasquez and himself for the conquest of Mexico, or rather for obtaining a recognition of Spanish supremacy, and as much gold and precious stones as possible. Against the orders of Velasquez, who suspected C.'s ambition, the latter sailed on 10th February 1519 from Havanna. At his final muster at Cape Antonio, he had only 110 marines and 550 soldiers with a few Indians. After establishing himself in Tabasco (where he first met with Marina), C. proceeded to a point near Vera Cruz, and entering into friendly relations with the natives, demanded permission to visit Montezuma, the Emperor of the Aztecs, in his capital, Mexico, which was refused. After burning his ships, and allying himself with the Totonac tribe, and with the republic of Ilascale (which, however, at first resisted the Spaniards), C. advanced to Cholula, where he was well received, but where Marina soon discovered a plot which led to a massacre of the inhabitants. On 8th November 1519, C. with 400 Spaniards and 6000 natives entered the capital, and by a bold, menacing attitude contrived to get the meek and superstitious Emperor into his custody at the palace of Axayacatl. Montezuma declared himself a vassal of Karl V., gave up enormous treasures, and assigned a native temple (part of the Teocalli) for Christian worship. Leaving Alvarado in command, C. was now obliged to descend to the coast, and encounter the force which Velasquez had sent out against him under Narvaez. This was successfully done, but on his return to Mexico, he found that the slaughter of 600 Caciques had at last provoked open war. A long struggle was ended by the *Noche Triste*, when the Spaniards were driven out of the capital, but the desperate engagement at Otumba (8th July 1520), in which the Aztecs fled, encouraged C. to prepare at Tezcuco a second expedition, in which a large number of natives became his allies. After a terrible siege of nearly three months, marked by the loftiest heroism on the part of the new Emperor, Guatemogin, and his people, Mexico fell (13th August 1521) amid the most frightful carnage and destruction of property. Appointed Captain-General of the conquered territory, C. energetically set about the work of reconstruction; he rebuilt the capital, founded and conferred municipal privileges upon the colonies of Zacatula, Coliman, San Esteban, and Medellin, introduced the Franciscan mission, which in twenty years secured at least a nominal acceptance of the Christian religion throughout the country. The regulated slavery which he sanctioned in the system of *encomenduro* and *repartimientos* was not unsuited to the Aztec character. In 1526, partly because, without apparent reason, he had put Guatemogin to death, C. was recalled to Spain, where he was received with great honour. Returning to America as military governor, but without civil authority, he spent ten years in exploring the Darien isthmus and the coast up to California. The arrival of the Viceroy Mendoza, in 1540, disgusted him with Mexico, and he again withdrew to Spain, where, after a decided rebuff at court, he died near Seville on 2d December 1547. His great wealth was devoted partly to the erection of an hospital, a college, and a convent in Mexico. The despatches of C. to Karl V. have been published in English (New York, 1843). See Helps' *Life of C.* (2 vols. 1871), and Prescott's *Conquest of Mexico* (1843).

Corti, Organ of, one of the delicate apparatuses found in the internal ear in connection with the terminations of the auditory nerve, discovered by the Marquise di Corti, an Italian nobleman, and hence named after him. See EAR.

Corto'na, a town in the province of Arezzo, Italy, 52 miles E.S.E. of Florence. It was one of the most ancient cities of Etruria, and possesses the massive remains of masonry known

as *Cyclopean walls*. The Romans founded a colony here in the time of Sulla, but it is not mentioned by any ancient author subsequent to Pliny and Ptolemy. C. decayed for a time, but revived after the 11th c. Its cathedral has some fine paintings, and its museum has numerous relics of antiquity, especially bronzes. Excellent marble is worked in the vicinity. Pop. upwards of 3500.

Coru'ña, a fortified seaport at the extremity of a small peninsula at the mouth of the C. river, on the N.W. coast of Spain, province of C. (part of the former Galicia). It consists of two towns, the upper and lower (called also Pescaderia), the former of which is walled, and has a citadel which protects the harbour. This is commodious and well frequented by ships, which makes C. one of the most prosperous towns in Spain. In 1874, 304 vessels of 116,061 tons entered the port. It has manufactures of cigars, soap, starch, and cotton, and its sardine fishery is extensive and valuable. Its commerce with England and America is considerable, and it has steamboat communication with Ferrol and the whole N. coast of Spain. Pop. 30,137. C. is said to have been founded by the Phœnicians. It was known to the Romans under the name of *Caronium* (whence the modern C.). From its bay the Armada set sail in 1588. Ten years later it was captured and burned by the English, and here Sir John Moore fell after a glorious repulse of the French, 16th January 1809. The *province* abounds in copper and iron ore.

Corun'dum (Hind. *karund*), a mineral species which includes under its varieties the most precious stones—the ruby, the sapphire, oriental topaz, and oriental amethyst, as well as that commonly recognised as C. and emery. Commercially the name C. is restricted to the crystalline forms of emery forming hexagonal dingy-coloured crystals. It is composed essentially of pure alumina, and next to the diamond is the hardest of all known substances. It is found abundantly in Asia Minor, the Carnatic, Ava, and near Canton, besides many places in the United States. It is used as Emery (q. v.).

Cor'vei, or **Korvei** (*Corbeia nova* or *Saxonica*), formerly a Benedictine abbey of princely rank, on the Weser, near Hoxter, in Westphalia. It dates from the year 816, and its first monks were a colony from a monastery of the same name in Picardy. Acquiring large possessions and important privileges, C. became in the middle ages a centre of Christian civilisation in Northern Germany. In 1794 it was erected into a bishopric by Pope Pius VI., and at that time it owned land 22 sq. miles in extent, with 10,000 inhabitants. This territory came into the possession of the House of Orange in 1802, and of Prussia in 1815. It now belongs to the House of Hohenlohe-Schillingsfürst. The magnificent Gothic church contains numerous interesting monuments, but the library and all reliable records of the history of the abbey have been destroyed. A *Chronicon Corbejense*, published in 1823, is of doubtful value. On the other hand, the *Annales Corbejenses*, printed in Pertz's *Monumenta Germaniæ Historica* (vol. iii.), are reckoned genuine. See Wigand's *Geschichte der Abtei K.* (Höxter, 1819).

Corvette', a ship of war ranking next to a frigate. It is flush-decked and ship-rigged, and has one tier of guns only.

Cor'vidæ, the Crow family, included in the Conirostral (q. v.) section or sub-order of the order Insessores or Perching birds. The members of this group are recognised by their strong, compressed, and conical bills, covered with small stiff feathers at the base; by the ridge of the upper mandible being curved and its top notched, and by the tarsi being 'plated' in front. The food consists of both animal and plant matters. Various sub-families exist, including the true crows, tree crows, jays, magpies, choughs, nut-crackers, &c.

Cor'vo, one of the Azores, the most north-westerly of the group, 6 miles long by 3 broad, is of volcanic origin. It is fertile and well wooded, and exports hogs, wood, and wheat to the other islands. Pop. about 1000.

Cor'wen ('the white choir'), a town in Merioneth, N. Wales, on a height overlooking the Dee, 10 miles W. of Llangollen. It is said to be the spot to which Owen Glendower retreated when Henry IV. invaded and overran Wales, and tradition points out his sepulchre in the parish churchyard, Pop. of parish (1871) 2464.

Coryda'lis. See FUMARIACEÆ.

Corygaum', or **Korygaum**, a village in the district of Poona, province of Bombay, 16 miles N.E. of Poona, memorable for the defeat, on January 1, 1818, of the Peishwa (Bajee Rao) of the Mahrattas, whose forces (25,000 in number) were repulsed with immense loss, after a protracted struggle, by Captain Staunton with a mere handful of sepoys and some twenty-four European artillerymen.

Coryla'ceæ. See CAPULIFERÆ.

Cor'ylus. See HAZEL.

Cor'ymb. See INFLORESCENCE.

Corym'bus (Gr. *korumbos*, 'the top,' 'the head'), a mode of dressing the hair among the Greeks by tying it in a cluster or knot on the top of the head. The name was also given to the cluster of ivy leaves, garlands, or berries, with which Greek vases were encircled, and to the high sterns of ships.

Corynocar'pus, a genus of New Zealand trees belonging to the natural order *Myrsinaceæ*, one of which, *C. lævigatus*, is cultivated in this country. The fruits and seeds of this tree are valued as articles of food by the natives. The seeds contain a farinaceous substance which renders them nutritious, but if eaten before being steamed for at least twenty-four hours, and then being either buried in the ground or allowed to soak in water for some days, they are poisonous, producing partial paralysis, spasmodic pains, and giddiness.

Cor'ypha. See FAN PALM, GEBANG PALM, and TALIPOT PALM.

Coryphæ'us (from Gr. *koruphē*, 'a summit'), lit. the head man or leader, but specially applied in the Attic drama to the leader of the chorus. Hence any one of admitted pre-eminence in his art is called a C.

Cor'yphene (*Coryphæna*), a genus of Teleostean fishes, family *Coryphænidæ*, having a compressed body, with the dorsal fin running from head to tail, and the head as if abruptly truncated. The Dorado (*Coryphæna hippuris*), found in the Mediterranean Sea and elsewhere, is the best known of the family. They are remarkable for their iridescent metallic tints, which pass through a series of changes when the fish is dying, giving rise to many poetical allusions. The Dorado is also, but erroneously, styled 'Dolphin' (q. v.).

Cos, known in more ancient times by the names of Meropis and Nymphæa, is an island on the western shore of Asia Minor, nearly opposite Halicarnassus. Its modern name is Stanko or Stanchio. It is about 23 geographical miles in length, and about 65 in circumference. It is mountainous in the S. and W., but level and fruitful in the N. and E. The great fertility of C. gave rise to the proverb, applied to an insatiable person, 'Quem Cos non nutrit, hunc neque Ægyptus.' C. was famed for its ointment and purple dye, and specially so for its wine, and also for its silk and cotton manufactures. It was the birthplace of Ptolemy Philadelphus, of the painter Apelles, and of the physician Hippocrates. The chief town, C., near which stood a magnificent temple of Æsculapius, was in the N.E. The island now belongs to Turkey, and has a pop. of 8000.

Coscin'ium, a small genus of plants belonging to the natural order *Menispermaceæ*. The wood, bark, and roots of *C. fenestratum* of Ceylon are valued as stomachics and tonics. The wood has been imported and sold as the true Calumba-root (Bentley): it contains *berberia*, and yields a yellow dye.

Coscinoman'cy (Gr. *koskinon*, *manteia*), practice of divination by means of a sieve, was chiefly used for the discovery of thieves. The sieve having been suspended by a pair of shears, and mystical words spoken, on the mention of the thief's name, the sieve turned round.

Cosen'za (anc. *Consentia*), the capital of the province of Calabria Citta, Italy, stands in a valley at the junction of the Crati and Busento. C. has manufactures of silk, pottery, and cutlery, and a trade in wine, fruits, and flax. It was the ancient capital of the Bruttii, and was an important town during the middle ages. Alaric the Visigoth died here in 410. Pop. (1872) 17,753.

Cos'mas, commonly called *Indicopleustes* ('Indian voyager'), in early life a merchant and traveller, afterwards a monk, was an

Egyptian who flourished in the 6th c. A.D. His chief work, the *Topographia Christiana*, in twelve books, was written to prove that the earth is a vast plain. It contains much, and in general accurate, historical and geographical information, and is specially noted for its description of the *Monumentum Adulitanum* (see ADULE). The best edition is that of Montfauçon, in his *Collectio Nova Patrum et Scriptorum Græcorum* (vol. ii. Par. 1706).

Cosmet'ics (Gr. *kosmetikos*, 'skilled in adorning') are, broadly speaking, preparations applied to the human frame with the view of beautifying it, but the word is commonly limited to powders, salves, &c., designed to improve and preserve the complexion. Many of the preparations, containing bismuth, &c., are noxious.

Cosmog'ony (Gr. *kosmos*, 'the universe,' and *gonē*, 'generation') is an account of the genesis or creation of the universe, or the science which treats of its origin. Every nation possessed of an antique literature has also a C., held by those who believe in it to have been committed to the writer by divine inspiration, and to differ from all other cosmogonies exactly as truth differs from fiction or human speculation. The germs of all these cosmogonies and theogonies are to be found in the Vedas and Zend-Avesta, the most primitive extant literature of the Aryans. (See TRINITY.) In the first chapter of the Laws of Manu (q. v.) we find the ancient Hindu C. The universe existed at first only in the divine idea, as if involved in darkness. Then first God created the waters, called *nara*, because the product of God's breath or spirit (of his nostrils, *nara*); hence he is called Narayana (moving on the waters, cf. Gen. i. 2). He then created the heavens and the earth. The creation of mankind was by God drawing forth from the supreme soul *mind*, then consciousness, then all vital forms endowed with the qualities of goodness and darkness (sin), and the five senses. He gave names to all creatures, and being to time and its divisions, to the stars, planets, mountains, oceans, rivers, valleys, &c. That the human race might multiply, he made them half male and half female. In the C. of the Zend-Avesta, Ormuzd (q. v.) created the visible world by his word in six periods or thousands of years. A remarkable analogy exists between the cosmogonies of the Phœnicians, Hebrews, and Babylonians, which are all evidently derived from the primitive Chaldean or Accadian trinity of Na or Anu ('the sky'), Ea or Enci ('the earth'), and Mulge ('the lord of the under world'). In the beginning all was darkness and water; this was followed by the division of day and night; then came the making of the sun and the moon, followed by that of animals and man. The Accadian mythology, being based on a rude astronomy, was very fond of the number *seven*, every seventh day being a 'day of rest.' The basis of the Phœnician C. is the Trinity Baau ('chaos'), Spirit, and Mot ('slime'); of the Babylonian, Sige ('the sky, or the primitive substance of the universe'), Aos ('the earth'), and Bel ('the Demiurge or Creator'). Sige bore Moumi (Heb. *mami*, 'waters'); the spirit of Aos brooded over the abysmal deep, and was married to Davke (Phœn. *bahu*, Heb. *bohu*, Gen. i. 2, 'emptiness'). See Smith's *Assyrian Discoveries* (1875); Müller's *Lectures on the Science of Religion; Chips from a German Workshop* (vol. i. 1868–70); Muir's *Original Sanskrit Texts*, &c.; *Contributions to a Knowledge of the C., Mythology, &c., of the Indians in the Vedic Age* (vol. v. 1870).

Cosmora'ma (Gr. *kosmos*, 'order,' 'ornament,' and *horaō*, 'I see'), an exhibition of pictures of different parts of the world, which are placed horizontally on a table, reflected by mirrors leaning diagonally opposite them, and looked at through a convex lens in front of each mirror. The pictures are illuminated by lights so placed as not to be reflected by the mirrors.

Cos'mos. See COSMOGONY.

Cosne, a town of France, department of Nièvre, at the confluence of the Loire and Nohain, 33 miles N.N.W. of Nevers, with which it has railway communication. The ruins of its fortifications and castle show it to have been a place of great importance and strength in the middle ages. It has several old churches, a suspension bridge over the Loire, manufactures of chains, anchors, cutlery, &c., and a trade in vegetables, grains, wood, wine, and cattle. Pop. (1872) 5024.

Coss'acks (Russ. *Kasak*), a warlike slave-people of S. Russia, who formerly played a considerable *rôle* in the progress of Russian conquests, from their efficiency as light cavalry. They still constitute an important part of the Russian army, and are settled or stationed in different parts of the kingdom. The principal branches of this race are (1) the *Malo-C.*, or C. of Little Russia, of whom the *Zaporovian* subdivision, on the Dnieper, are a predatory and unruly class; and (2) the C. of the Don, nearly 1,000,000 in number, who hold 60,000 sq. miles of steppe-lands, and form a distinct government, military in its organisation, and under the rule of a Hetman, holding the rank of general. Their chief town is Novo-Tscherkask. There are also several Cossack tribes who, from the localities in which they are stationed, are serviceable as frontier guards—as the Siberian C. on the S. border of Siberia, the C. of the Caucasian line (254,000 divided into twelve regiments), &c. See Lesur's *Histoire des Kosaques* (2 vols. Par. 1814), Bronevskij's *Istoria Donskova Vojska* (2 vols. Petersb. 1834), and Mackenzie Wallace's *Russia* (Lond. 1877).

Cossimbazar' ('Cossim's Market'), a suburb and the port of Moorshedabad, on the Bhagirathi, one of the mouths of the Ganges. Its silk manufactures, once famous, have much declined. It is now better known by the name of 'English Bazaar,' and had in 1872 a pop. of 12,859.

Coss'us. See GOAT MOTH.

Cos'ta, Isaac da, a poet and theologian, was born of Jewish parents at Amsterdam, January 14, 1798. After receiving a liberal education, and graduating in his twentieth year as Doctor at Law, he renounced Judaism and received Christian baptism, a change which subjected him for a time to persecution. Among his best-known works are his version of Byron's *Cain*; his *Israel and the Gentiles*, and *Harmony of the Gospels*, which have been translated into English; and the *Battle of Nieuwpoort*, a poem of much excellence. He died at Amsterdam, April 28, 1860.

Costa, Sir Michael, a living musical composer and conductor, was born February 1810, at Naples, and educated there. He came to England in 1828, and his reception was such as to induce him to settle in this country. He has been the conductor of the Royal Italian Opera (Covent Garden), and also of the Sacred Harmonic Society, for many years, and received the honour of knighthood in 1869. His reputation as a composer rests chiefly upon two oratorios of considerable merit—*Eli* (produced 1855) and *Naaman* (produced 1864).

Costa Rica, the most southerly of the republics of Central America, bounded on the N. by Nicaragua, on the S. by the United States of Columbia, and extending E. and W. from the Caribbean Sea to the Pacific. Area, 21,484 sq. miles; pop. (1875) estimated at about 200,000. C. R. is intersected diagonally by a mountain range. There are numerous volcanoes, and earthquakes are frequent. The low grounds along the coasts are very unhealthy. The soil is fertile, the principal product being coffee, though sugar, cocoa, and tobacco, at present raised only in quantities sufficient for home consumption, would be extensively cultivated were there railway communication to allow C. R. to compete profitably with other countries. Of the railroad commenced from Alajuela to Limon, only 42 out of 114 miles have been completed. The capital is San José, and the principal port is Punta Arenas ('Sandy Point'), on the Gulf of Nicoya. The value of the exports for 1874 was £912,800, the whole for coffee with the exception of £20,000. No return of the imports has been made, but it is supposed that there had been a considerable falling off as compared with those of 1873, which were £753,000. The principal imports are Manchester goods, silk, cloth, hardware, flour, salt, provisions, and wines. Gold, silver, and copper are found, but mining industry has greatly decreased. There is no manufacturing industry. In the budget estimates for the year ending April 1874, the revenue was estimated at £562,517, and the expenditure at £865,719. In 187[illegible] a loan of £2,400,000 was contracted for the purpose of constructing railways and other public works, but very little of it reached C. R. The procedure of the financial agents who managed the loan was exposed by the Committee of the House of Commons on Foreign Loans, 1875. The government is republican, its constitution dating from 22d December 1871. The President is elected for four years, and the National Congress is composed of a single chamber.

Cos'tello, Louisa Stuart, an English authoress, was born 1815. She became known to the literary world by her *Specimens of the Early Poetry of France*, published in 1835. From that

time almost to her death in 1870, Miss C. wrote incessantly, her works being chiefly accounts of travelling tours, histories, and novels. Her style, especially in the description of scenery, is very pleasing. Her brother, **Dudley C.**, is also a writer of tales and travels.

Cos'ter, Laurens Janszoon, claimed by the Dutch as the inventor of printing, was born at Haarlem about 1370, and must have commenced to practise the art at some period between 1420 and 1426. His invention, said at first to have been used by him only to print verses of the Bible and moral precepts for the instruction of his children, was afterwards practised for gain, but in secret. The assistants he was compelled to employ were sworn not to divulge his secret; but on his death in 1439, one of them, Johann Gänsfleisch, stole some of his tools and types, and set up a press at Mayence. C. at first used wooden types, but afterwards metal ones, cast in sand. His *Speculum Humanæ Salvationis*, commenced with wooden blocks, was finished with the movable metal types, and presents a singular mixture of pages in fixed and movable characters. Before he availed himself of cast types, his impressions were produced by rubbing, and the page was printed only on one side; afterwards he used the press, and printed both sides of the page. Such is the account given by the Dutch, which is pressed with much cogency by M. Auguste Bernard in his *Histoire de l'Origine de l'Imprimerie*, and by many others, among whom the most recent is Ottley in his *Inquiry into the Origin of Engraving* (Lond. 1876). See also M. Didot's *Essai sur l'Art Typographique* (1852). C. died about 1440. For the arguments in favour of the German claim to the invention, see GUTENBERG. In July 1856, the people of Haarlem erected a bronze statue to C. in the market-place.

Costs is the technical name in English law for expenses in legal proceedings. Generally the C. of the successful party are mainly paid by the loser; but there are in all lawsuits extra-judicial expenses incurred on both sides which each party will have to pay for itself, whatever be the issue. Then, while one gains on the main point, it may be found to have been wrong on minor points, which will cause a modification of C. C. are 'taxed'—that is, the items are allowed or disallowed—by an officer of the court, called *the master*. The equivalent legal term in Scotland is *Expenses* (q. v.). (See also AUDITOR OF THE COURT OF SESSION.) In actions for libel and some others, the smallest award of damage carries full C., unless the judge certifies *in favour of the defendant*, which deprives a plaintiff of C. Any one suing *in forma pauperis* does not pay C., but he is entitled to receive them if successful. To entitle one so to sue, he must swear that he does not possess the value of £5.

Costume (Old Fr. *coustume*, Med. Lat. *costuma* (Chartulary of 705), from Lat. *consuetudinem*, by contraction, 'custom or habit'), dress or clothing, in its historical relations, and regarded as connected with dignities, official position, and functions. C. is thus spoken of as characteristic of particular periods of time, of distinct tribes and nationalities, of certain stages of civilisation, and as indicative of rank, position, and power. In modern days, the incessant fluctuations of fashion, and the tendency of our civilisation to produce a level uniformity among nations as well as individuals, have greatly interfered with the continuance and development of the characteristic costumes of different peoples. But as the so-called leaders of fashion operate only within certain very narrow bounds, and fundamental changes in dress are slowly effected, we are warranted in saying that, so far as regards male attire at least, the C. of the 19th c., with its chimney-pot hats and dress-coats, is as characteristic as that of any preceding age. (See FASHION.) The costumes of classes, however, such as that of the peasantry, and of small isolated communities, are rapidly disappearing, and, indeed, in the most advanced countries, have almost entirely vanished. In the middle ages, and down to comparatively recent times, the costumes of various social grades were strictly prescribed by sumptuary laws; and even had freedom of choice existed, far less variety of materials was available than can be commanded by the very humblest of the present day. Costumes indicative of rank and position still exist, as in the case of the robes, crowns, and coronets of royalty and nobility, and many professional, academic, and official positions are indicated by peculiarities of C. A characteristic class of C. is still rigidly adhered to by the 'fishwives' along the E. coast of Scotland.

It is only in recent times that the study of C. in its historical relations has come to be pursued with care and painstaking. Artists of the 16th c., in their treatment of all Scriptural subjects, from the Creation down to the Christian era, did not hesitate to employ the C., architecture, and formal gardens of the Renaissance period, and similar anachronisms were the rule on the stage. For the study of ancient C., it therefore becomes necessary to obtain contemporary representations of the period or people under investigation; and for this end illuminated MSS., coins, medals, carvings, and painted pottery are of the utmost value. Such remains of the principal nations of antiquity are fortunately still largely available, and they yield large stores of information regarding the C. and other ethnographic relations of the periods to which they belong. With such sources of information laid open by the labours of archæologists, fidelity in the representation of C. is a modern essential in all delineations, both literary and artistic. The artistic treatment of the C. of the present day is a matter of no small difficulty, especially to the sculptor, and by many artists the difficulty is avoided by resorting to the more graceful flowing robes of antique models. This, however, is as indefensible as the representation of the Virgin in the guise of an Italian *contadina* by Renaissance artists. The unpromising task of the faithful and artistic management of modern C. in statuary was very fairly and successfully grappled with by the late J. H. Foley, R.A.

Cos'tus, the root of an Arabian plant, at one time believed to have been allied to *Cardopatum corymbosum*; but most botanists now adopt the views of Falconer in considering it to be the *Aplotaxis Lappa*, or *Aucklandia C.* of Cashmere, used as a perfume and for burning as incense, and by the Chinese as an aphrodisiac. *C.* is also the name of a genus of tropical herbs belonging to the order *Zingiberaceæ*, many of which are cultivated in stoves.

Cos'way, Richard, R.A., of Flemish extraction, was born at Tiverton, Devonshire, in 1740, studied art to such purpose that between his fourteenth and twenty-fourth year he obtained five premiums from the Society of Arts. He was patronised by Sir Joshua Reynolds, elected a member of the Royal Academy in 1771, and rapidly acquired fame and fortune as a painter of miniature portraits. His wife, Maria Hadfield, was a most accomplished musician and artist, and the receptions he gave at his house were among the most brilliant of his era. C. died 4th July 1820.

Cot (Old Eng. *cote*, *cyte*, 'a bed,' 'a cottage'), in nautical language, an officer's bed, as distinguished from a seaman's hammock. It is made of canvas in the form of a chest, and is kept stretched by a wooden frame. The mattress is placed within the C., and, like the hammock, it is suspended from the roof of the cabin. The term C. is also applied generally to a child's bed, especially the swinging cradle.

Côte-d'Or, a department in the E. of France, and part of the old province of Burgundy, named from the chain of the Côte-d'Or ('hill of gold,' so called from the excellence of its vintages) which traverses it from N. to S. Area, 3380 sq. miles; pop. (1872) 374,510. C. is watered by the Seine, the Saône, and the Aube, and is intersected by the Burgundy Canal. It is one of the most fertile districts of France. The surface is in general elevated and covered with coppice, and the climate salubrious. Iron and coal, anthracite, and marble are abundant; there is a large trade in lithographic and mill stones, and also in wine. C. is divided into four arrondissements. The chief towns are Dijon (the capital), Beaune, and Semur.

Côtes-du-Nord ('coasts of the North'), a department in the N. of France, part of the old province of Bretagne. Area, 2660 sq. miles; pop. (1872) 622,295. From E. to W. it is traversed by the Montagnes Noires, of granitic and Silurian formation, the highest point of which, Menez Haut, is 1112 feet above the level of the sea. The largest rivers are the Rance, Arguenar, Blavet, and Oust. Flax, hemp, pulse, beetroot, and even maize are cultivated; the hills afford excellent pasture; the cattle and horses, especially the latter, are famed; and along the coast are valuable fisheries. The chief manufacture is that of linen. C. contains five arrondissements. The principal towns are St Brieuc (the capital), Dinan, and Guingamp.

Cotes', Roger, a mathematician, was born 10th July 1682, at Burbage, Leicestershire, studied at Trinity College, Cambridge, where he took his degree in 1706, and was appointed Plumian Professor of Experimental Philosophy. In 1713 he published a new edition of Newton's *Principia*, the characteristic feature of which is the preface. The high expectations which were entertained of this promising genius were blighted by his premature death on June 5, 1716. He published a few papers in the *Philosophical Transactions*, and his principal works are *Harmonia Mensurarum* (1722) and his *Lectures on Hydrostatics* (1737), both posthumous publications.

Cotes'wold or **Cots'wold Hills** (Welsh, *coed*, 'wood,' and Eng. *wold* (earlier *weald*), the same, hence 'woody hills'), a range in Gloucestershire, extending from N. to S. upwards of 50 miles. The highest point is Cleare Hill, 1134 feet. Turnips and clover are cultivated on these hills, and coarse-haired sheep are fed there. The forests from which they derive their name have disappeared.

Cöthen. See KÖTHEN.

Cothur'nus. See BUSKIN.

Cotillon (from the Old Fr. *cote*, Lat. *cottus*), literally a gown or petticoat, was figuratively applied to a French dance extremely popular in the beginning of the 17th c. It combined the diverse qualities of the polonaise and the minuet, greatly resembling the quadrille, by which it was eventually eclipsed. In Burns' *Tam O'Shanter* occurs the line—

'Nae *cotillons* brent-new frae France.'

Cotin'ga (*Ampelis*), a genus of Insessorial birds belonging to the family *Ampelidæ*, or 'Chatterers,' and section *Dentirostres*. It is S. American in its distribution, and the bill, which is of feeble conformation, is deeply cleft. The plumage exhibits very brilliant hues.

Cotise', or **Cotice** (Fr. *côté*, 'a side'), in heraldry, a diminutive of the Bend (q. v.), being a fourth of its width. The other diminutive is the *bendlet*, which is twice as wide as the C. Couped at its extremities, the C. becomes a *riband*.

Cotise, or *Cotice*, in heraldry, describes a bend between two cotises, a fesse or bar between two barrulets, or any heraldic object sided or accompanied by another.

Cotoneas'ter, a genus of plants consisting of trees or small trailing shrubs, belonging to Northern Europe and the mountains of India, cultivated for the beauty of their foliage, flowers, and fruit, the latter being (especially in the case of *C. frigida* and *C. affinis*) of an intense scarlet colour, and remaining on the trees for the greater part of the winter. *C. vulgaris* is believed to be a native British species. In addition to those mentioned, *C. microphylla*, *C. marginata*, *C. rotundifolia*, and *C. buxifolia* are among the most valued cultivated species.

Cotopax'i, a volcano in the Cordilleras of the Andes, 18,811 feet above the sea-level, with a cone rising in perfect regularity 4400 feet above the plateau of Quito, and covered with snow almost to the verge of the crater. Its flame is said to have risen in 1738 to the height of 3000 feet, and in 1803 its internal heat was great enough to melt the snow on the exterior walls of the cone. A great eruption of C. took place June 26, 1877.

Cotro'ne, the ancient *Croton* or *Crotona*, a town in the province of Calabria Ulteriore II., Italy, on a projection at the mouth of the Esaro. Its streets are narrow, and its harbour, protected by a mole, admits only vessels of light draught. C. has a cathedral, and corn, wine, oil, and silk are produced in the vicinity. Pop. above 7000. The ancient C., founded by a colony of Achæans in 710 B.C., was one of the wealthiest and most famous cities of S. Italy. The inhabitants excelled in athletic exercises, and the celebrated Milo was a native of the place. Pythagoras founded here a school of philosophy. The city was so exhausted by the ravages of the second Punic War that the Romans sent a colony to recruit its population in 194 B.C. Some ruins are still visible in the neighbourhood of the modern town.

Cott'a, the name of an old and still flourishing German publishing house. The first publisher of the name was **Joh. Georg C.**, the descendant of a family which had removed in the beginning of the 15th c. from the Milanese to Germany. He acquired by marriage in 1642 the book trade established in Tübingen by Brunn. His son, **Joh. Friedr. C.**, a distinguished theologian, was born at Tübingen, 12th May 1701, and died there, 31st December 1779, chancellor of the university. The grandson of the last mentioned was **Joh. Friedr., Freiherr von C.**, born at Stuttgart, 27th April 1764. After serving some time in the Austrian army, and subsequently practising as an advocate, he undertook in December 1787 to conduct the family publishing business, and soon distinguished himself by his judgment and enterprise. In 1798 he established the still influential *Allgemeine Zeitung*. Other periodicals followed, as the *Almanach für Damen*, the *Morgenblatt*, and *Literaturblatt*. He also published the works of such authors as Goethe, Schiller, Herder, Fichte, Jean Paul, Tieck, Voss, the brothers Humboldt, and Johann von Muller. Johann Friedrich retired to Stuttgart in 1810. The ancient nobility of the family was restored in his person, his title being Freiherr C. von Cottendorf. He died 29th December 1832. He was a man of fine character—liberal, pure, and unselfish in all his actions. The business of the firm is widespread. It exists in seven different branches—(1) The bookselling firm of *J. G. C.* at Stuttgart; (2) the *Allgemeine Zeitung* at Augsburg; (3) the literature and art establishment at Munich; (4) the publishing firm at Leipsic; (5) the publishing firm at Munich; (6) the Bible establishment of J. G. C. at Stuttgart and Munich; (7) the book-printing business at Stuttgart.

Cott'age, the general name for the rural dwellings, small and isolated, of the poorer classes. Adjoining each C. there is usually an allotment of ground which is cultivated by the occupants. The cottages of the agricultural labourers were, till a few years ago, in a very neglected condition, and the recent improvements in their construction with regard to ventilation, general convenience and comfort, and economy in erection, are in great measure due to the deliberations of the Society of Arts, in whose *Journal* much valuable information may be obtained. A neat detached house for persons in better circumstances, in town or country, is called a *C. orné*.

Cott'bus. See KOTTBUS.

Cottin, Sophie, a favourite French novelist, born at Tonneins (Lot-et-Garonne) in 1773. She married a banker of Bordeaux, and being left a widow at the age of twenty, thenceforth followed literature. Her chief works are *Claire d'Albe* (1798), *Malvina*, *Amélie Mansfield*, *Mathilde*, and (greatest of all) *Élisabeth, ou les Exilés de Sibérie*, published in 1806. The many translations of this book attest its popularity. Madame C. died at Paris, August 25, 1807. A collected edition of her works was published at Paris (5 vols. 8vo, 1817).

Cott'on, the hairs which surround the seeds of various species of *Gossypium*, a genus of plants belonging to the natural order *Malvaceæ* (mallows, hollyhocks, &c.), and which constitute the well-known textile material of that name. Between twenty and thirty species of *Gossypium* are imperfectly described, but the real number of distinct forms is probably much less. The genus is indigenous to Asia and America, but it is now almost universally cultivated in all parts of the world 36° N. and S. of the equator. They are herbaceous, or shrubby perennial plants, varying from 2 to 15 feet in height. The flowers are generally large and showy, and the seeds, which are covered with the long filaments called 'C.' (and each of which consists simply of long Cells, q. v.), contain a bland oil, used for various purposes in the arts. From the seeds is also formed a cake used in feeding cattle. Of *G. barbadense*, the species cultivated in the United States, there are two well-marked varieties—the long-staple or Sea Island C., and the short-staple Upland, Georgian, or bowed C., which forms the bulk of what grows in Ame-


Cotton.

rica. Egyptian and Bourbon C. also belong to this variety. In the United States the harvest commences in August, and lasts until December. *G. herbaceum* is a native of India, and is grown in Persia, the Mediterranean countries, &c. *G. peruvianum*, or kidney-C., is indigenous to Peru, Bahia, and other parts of Brazil, &c. *G. arboreum* is a tree-like plant of India, China, &c., but commercially is of little importance. The term 'C.' is, however, applied to various other plants—*e.g.*, French C. is *Calotropis procera*; lavender C., *Santolina chamæcyparissus*; New Zealand C., *Plagianthus betulinus*; silk-C., the fibre from *Bombax*, *Calotropes*, *Cryptostegia*, *Ercodendron*, &c.; wild Australian C., *Gomphocarpus fruticosus*; wild Natal C., *Ipomœa Gerrardi*, &c. The C.-plant of Otago is *Astelia*.

Production and Commerce.—The cultivation of C. takes rank in extent and value above all other crops, wheat and rice only excepted. The enormous demand for C. manufactures may well be conceived when it is borne in mind that almost every individual human being uses C. largely for dress purposes; besides which it is employed for a vast variety of domestic purposes. Although C. now occupies this pre-eminent position among manufactures, it is only within comparatively recent times that it has risen into importance. It is known to have been cultivated and used in India and China at least 500 years B.C., but it did not rank as a great European staple till about the beginning of the present century. In 1700 the amount of C.-wool consumed in Great Britain did not exceed 1,000,000 lbs., yielding employment to 25,000 operatives. By 1775 the consumption had risen to 4,800,000, after which, owing chiefly to the inventions of Hargreaves, Arkwright, and Crompton, the industry rapidly developed, and we find that in 1800 the imports of C. fibre into Great Britain were 56,010,732 lbs., and the consumption about 50,000,000 lbs. In 1875 the C. manufactured in Great Britain weighed 1,228,543,470 lbs., giving direct employment to half a million of operatives. Thus, within a century, the C. trade of Great Britain has increased more than 250 fold.

C., as a crop, is cultivated in tropical and sub-tropical regions, its widest range being 40° on each side of the equator. Humboldt states that the three species *Gossypium barbadense*, *G. hirsutum*, and *G. religiosum* flourish best from the equator to 34°, in a mean annual temperature ranging from 68° to 82°, while *G. herbaceum* is best suited for more temperate climates, with a summer heat of 73° to 75°, and a winter temperature of not less than 46° to 48°. The great C.-growing region of the world is the Southern (formerly slaveholding) States of the United States, after which range in productiveness the E. Indies, Brazil, various countries bordering on the Mediterranean, and the W. Indian Islands. It is from these regions that the European demand is at present principally supplied, but in China, Japan, and other localities a great amount of C. is grown for native use. The colony of Queensland is capable of producing almost unlimited supplies of C. of the highest quality, and a considerable quantity is already cultivated by the colonists; while in Fiji, and other S. Pacific groups, a staple only equalled by the famous Sea Island can be cultivated, were labour difficulties removed.

In the United States the C.-seed is sown in March or early in April. The ground is prepared in ridges, and the seeds are placed in small clumps about 18 inches apart. After about a week the young plants are seen above ground, and when they have shot out their third or fourth leaf, they are gone over and thinned out. Later on they are subjected to a further thinning, only a single strong plant being then left in each place. In from ten to eleven weeks after sowing, the plants blossom, and the bolls continue to form and develop till the autumn frosts nip the plants. In India the sowing takes place in June, and the harvest is picked from February to April of the ensuing year. C. is a very delicate crop, easily affected as to bulk of yield and quality by climatic conditions, nature of soil, method of culture, and other influences, and the plants are also peculiarly liable to suffer from the attacks of various insects. When fully ripe, the capsule containing the fibre and seed bursts, exposing the C. in a snow-like mass, which may then be readily detached from the husk by hand-picking.

The seeds are removed from the C. fibre which envelopes them by a process called *ginning*, or by other mechanical agency. (See COTTON-SPINNING.) The C. is then compressed, either by a powerful screw-press or by a hydraulic press, into bales, which are secured by iron hoops, and it is then ready for the market. Bales from different countries vary in weight, Americans averaging 440 lbs.; Brazils, 160; Egyptians, 560 to 600; W. Indians, 200 to 220; Surats, 380 to 400; and Bengals, 300 lbs. C. is sampled, or its quality tested, by drawing out the fibres of a small tuft between the fingers and thumb, so as to lay them parallel and show their length and strength. A good sample should be bright, clear, smooth, firm, elastic, and strong. The fibre varies in natural colour from a pure silky white into slightly bluish and reddish tints, and in the case of the Nankin C. of China it has a strong yellowish-brown colour. The filaments vary in length from about half an inch to fully two inches; when not more than an inch in length it is denominated 'short-staple,' and when more than an inch, it is known as 'long-staple.' C. ordinarily contains about 6 per cent. of moisture; but exposure of bales in damp situations may cause it to absorb as much as 25 per cent. of water without feeling obviously wet. Damp C. is extremely subject to spontaneous combustion, and when any portion is soaked with oil it spontaneously ignites with very great readiness.

In the C. trade a standard graduated scale of qualities is recognised, that for Americans being, in descending series, 'fine,' 'good,' 'good fair,' 'fully fair,' 'middling fair,' 'good middling,' 'middling,' 'low middling,' 'good ordinary,' 'ordinary,' 'inferior.' According to the great geographical divisions from which the fibre is derived, stocks are classified and statistics are compiled; and under each of these divisions various qualities are recognised and prices quoted in trade lists. The Liverpool Cotton Brokers' Association arrange their returns under these six heads:—(1) *American*. This includes the whole produce of the United States, the principal varieties of which are Sea Island or Long Georgia (the famous long-staple C., which is the finest and costliest grown), Upland Georgia, New Orleans, Mobile, Alabama, &c. (2) *Brazilian*, including such varieties as Pernambuco, Santos, Bahia, Maceio, Maranham, and Parahiba. (3) *Egyptian*. (4) *Turkey and Greece*, a division which includes the Mediterranean region, Egypt excepted. (5) *West Indies, Peru*, and other South American localities. (6) *East Indian*, under which are ranged Bengal, Tinnevelly, Surats or Bombay, Dhollerah, Dharwhar, Broach, and Rangoon, &c.

The following table exhibits the imports and consumption of C. in Great Britain, stated at intervals of ten years from the beginning of the century down to 1861, with the same statement for each year since 1860, to show the effects of the American civil war on the trade. It also exhibits the average price per lb. each year of three standard qualities of C. The imports from various countries are stated in thousands of bales, and the total imports, as well as the consumption, is given in millions of lbs. The difference between the imports and consumption roughly represent the amount exported from Great Britain, and fluctuations in stocks held.

Year.	In thousands of Bales.					In millions of lbs.		Mid. Up land. Pence per lb.	Fair Pernambuco. Pence per lb.	Fair Surat. Pence per lb.
	American.	Brazil	Egyptian, &c.	West Indian, &c.	East Indian.	Total Imports.	Total Consumpt.			
1801	84	70	...	92	14	55·9	48·4	18	32	16
1811	128	118	...	65	15	91·3	98·0	12½	19	12
1821	300	121	...	41	30	129·0	129·0	9½	12½	7½
1831	609	168	38	11	77	280·0	262·7	6	7¾	4¾
1841	902	94	41	33	274	489·0	438·1	6½	8¼	4½
1851	1,394	109	67	5	329	759·6	658·9	5⅞	7¾	4½
1860	2,518	103	109	10	563	1,427·1	1,083·6	6¼	8⁷⁄₁₆	5
1861	1,841	100	98	10	987	1,259·9	1,007·4	8⁵⁄₁₆	9½	6⁵⁄₁₆
1862	72	134	147	20	1,072	533·2	451·7	17¼	18½	10½
1863	132	138	248	23	1,391	691·6	508·4	23¾	24½	19¼
1864	198	212	319	60	1,798	895·1	553·6	27½	28¼	21¼
1865	462	340	414	131	1,408	983·5	723·2	19	19½	14½
1866	1,163	407	200	112	1,867	1,355·3	881·1	15½	17¼	12
1867	1,226	437	198	129	1,511	1,274·3	966·7	10⅞	11¾	8½
1868	1,269	637	201	101	1,452	1,291·9	991·8	10½	15⅛	8¼
1869	1,040	514	226	106	1,496	1,197·2	938·9	12⅛	12¼	9½
1870	1,664	403	220	112	1,063	1,315·5	1,078·2	9¹⁵⁄₁₆	11½	8⅛
1871	2,249	515	272	133	1,236	1,688·3	1,207·1	8¹⁵⁄₁₆	9⁷⁄₁₆	5⅞
1872	1,404	717	305	166	1,288	1,373·5	1,181·0	10⁵⁄₁₆	10½	7¼
1873	1,898	471	328	138	1,069	1,507·9	1,244·8	9	9½	6⁵⁄₁₆
1874	1,958	497	300	118	1,042	1,519·7	1,277·4	8	8¾	5⁹⁄₁₆
1875	1,859	424	281	89	1,055	1,458·5	1,228·5	7⅛	7⅞	5

The subjoined statement exhibits the annual consumption of C. for the years 1875, 1873, and 1860, stated in millions of lbs., for the various C.-consuming countries of Europe and the United States.

The total consuming capacity at various dates of the world

exhibits the instructive fact that while C. industries in Great Britain continue to develop and extend, the manufactures in other lands are increasing in a more rapid ratio, in consequence of which, British manufacturers are gradually losing the great lead which they long held. The following figures, representing bales of 400 lbs., may be taken to represent the consumption of the world, and its proportional distribution :—

	Deliveries for Consumption in millions of lbs.		
	1875.	1873.	1860.
Great Britain .	1,230·3	1,243·2	1,126·9
France . .	242·3	205·1	269·7
Holland . .	77·9	69·3	48·3
Belgium . .	67·4	45·6	26·5
Germany . .	148·6	162·4	127·1
Trieste . .	58·1	50·3	31·7
Genoa . .	27·7	26·7	31·0
Russia, &c. .	256·0	169·8	137·1
Spain . .	67·2	59·0	46·4
United States .	552·4	528·4	438·2

	1860.		1876.		Increase.	
	Bales = 400 lbs.	Per cent.	Bales = 400 lbs.	Per cent.	Bales.	Per cent.
Great Britain .	2,817,000	49·4	3,187,000	44·6	370,000	13·1
Continent .	1,794,000	31·5	2,362,000	33·0	568,000	31·6
United States .	1,088,000	19·1	1,441,000	20·1	353,000	32·4
Bombay . .	...	...	164,000	2·3	164,000	...
	5,699,000	100·0	7,154,000	100·0	1,455,000	25·5

Cotton-Grass, or **Cotton-Rush** (*Eriophorum*), a genus of plants belonging to the natural order *Cyperaceæ* (tribe *Scirpeæ*), so called from the fine silky hairs or bristles which spring from the base of the ovary, and give the plants the appearance of being topped by cottony tufts, especially when seen waving in the wind on the bleak moors on which they grow. This 'cotton' has been used for stuffing pillows, making candle-wicks, &c., and it has even been proposed to utilise it for textile purposes. The stem of the Himalayan species, called *Bhabhur* (*E. cannabinum*), yields a fibre of which strong ropes are made. There are several British species (*E. angustifolium*, &c.), the leaves of which were at one time employed as a remedy for diarrhœa, and the pith as a vermifuge for tapeworm.

Cotton, Gun. See Gun-Cotton.

Cotton, Sir Robert Bruce, an eminent antiquary, was born at Denton, in Huntingdonshire, January 22, 1570. He was educated at Cambridge, and afterwards resided at London, where he devoted himself to archæology, and collected a number of charters, deeds, manuscripts, &c. (in many cases obtaining them from the monasteries, which had been dissolved half a century before), of the greatest value for their bearing upon the history and constitution of Britain. C. was knighted by King James, who employed him to defend Mary Queen of Scots against the shameful attack of Buchanan (q. v.), and published a pamphlet on the question of precedency between England and Spain, and another on the antiquity and dignity of Parliaments. Latterly, however, he lost the royal favour, and was even shut out from his own library. He died 6th May 1631.

The *Cottonian Library* is the library of Sir R. B. C., considerably increased by his son and grandson, which was invested in trustees for the benefit of the public. Besides coins and antiquities, it consists of about 900 volumes, a large number of which are state papers of the highest value, including diplomatic correspondence between England and the Continental states from the reign of Edward III. to that of James I. The library was placed in 1730 in Ashburnham House, Westminster, where a fire partially destroyed some of the volumes. Among the MSS. that suffered severely on this occasion was that of the Old English poem of Beówulf (q. v.). As the work had not then been printed, and no other MS. existed, it is singular to reflect that the most ancient, the most poetic, and the most picturesque product of the early Teutonic muse, was within an ace of absolutely vanishing from human knowledge. The Cottonian Library was removed in 1757 to the British Museum. See Edwards' *Memoirs of Libraries*.

Cotton-Seed Oil, a secondary product of the cultivation of cotton, of considerable value, is found in the oil obtained by expression from the seeds. The seeds are treated in the same manner as linseed, and yield a brownish fluid oil used for general purposes. The oil-cake of cotton-seed is a valuable cattle-feeding substance.

Cotton-Spinning. The various industries connected with the preparation of cotton for use constitute the most extensive and important of all textile manufactures. In Great Britain, cotton is indeed the staple of the leading industry, giving direct employment to more persons than any other, and absorbing the largest amount of capital. Though it is only in recent times, and principally within the present century, that cotton has attained a preeminent position in manufacturing industries, the fibre has been utilised in India, China, and other Oriental countries from the most remote period, and the indigenous cotton of America was employed as a textile material before the discovery of that continent by European explorers. The manufacture of cotton embraces spinning, weaving, bleaching, calico printing and dyeing; but only C.-S. will be here dealt with, the others being noticed under their respective heads.

The first operation in the preparation of cotton for spinning, after the fibre has been gathered, consists of *ginning*, or separating the fibre from the seeds which are enclosed within it. This is chiefly performed at the place of growth of the fibre, previous to packing it in bales for exportation. A variety of mechanism has been adapted for the operation, the most common being the saw-gin, in which a kind of revolving circular-saw apparatus tears the fibre away from the seed. Cotton, as imported, requires frequently to be freed from the grosser impurities mixed up with it by means of the *willow*, an apparatus so named from having been originally a cylindrical box or basket of plaited willows. It now consists of a box in which a series of iron spikes revolve with enormous rapidity over a gird-bottom, and in their revolution they toss about and open the cotton fibre fed into the apparatus, the impurities falling through the bottom. From the willow the fibre passes to the *opener* or *scutching machine*, which, in the case of clean staples, is the first apparatus through which the raw cotton passes. In this machine all the matted lumps of the cotton are teased out by means of a revolving beater, which strikes against the fibre with great violence. The impurities from the cotton fall through a gird-bottom under the beater, and the fibre is carried forward by the suction of a fan-blast. From the first opener the cotton passes to a second machine of the same nature called the *spreading frame* or *lap machine*, where, in addition to undergoing an additional opening and blowing, it is formed into a *spread lap*, or continuous roll of uniform breadth and thickness. The material is now ready for *carding*, the purpose of which is to disentangle the separate filaments, and lay them all parallel to each other. The carding engine is a complex apparatus, the principal feature of which consists of a series of cylinders revolving in opposite directions, such cylinders being covered with leather or vulcanised cloth studded with wire teeth or hooks, bent forward in the direction in which the cylinders are intended to revolve when in operation. Commonly the main cylinder of the carding engine is arched over by a series of flat top-cards or *flats*, which are toothed and stationary, and act against the main cylinder revolving under them. For fine C.-S. the fibre is passed through two such engines :—1st, the *breaker card*, which delivers the material in a broad thin fleece; and 2d, the *finisher card*, from which the cotton issues in a loose riband or *sliver*, ready for the drawing frame. Instead of the finisher card, a combing machine is sometimes used for the finer qualities of yarn, by which the short fibres are combed out, and the long fibres arranged in a beautiful uniform sliver. Still further to render the fibres parallel with each other, and to produce a uniformity in the sliver, the material next passes to the *drawing frame*. This apparatus consists of three pairs of rollers, placed behind each other, and caused to rotate at different rates of rapidity, so that the material fed into the first pair, when caught by the more rapidly moving second pair, is drawn out lengthwise in proportion to the different rate of motion. Between the second and the third pair the same difference holds, and generally the drawing frame is so arranged that six slivers fed together into the first pair are passed

out of the third elongated six times, and having consequently the thickness of one of the original slivers. The slivers are repeatedly subjected to this operation, till by doubling and drawing, the sliver, as delivered by the carding engine, is drawn out to one thousand times its original length. The drawn sliver is next passed to the *slubbing frame*, where it is further drawn out, receives a slight twist, sufficient to hold it together as a thin, loose rope, and is wound on a bobbin. In the *roving frame* the coils from two bobbins of slubbing are united, drawn out to still greater tenuity, twisted, and wound on a bobbin, and at this point the fibre is ready for the final operation of *spinning*. For this operation two kinds of machine are employed:—(1) The *throstle*, in which the roving is drawn out to a sufficient tenuity, twisted, and wound on bobbins in a series of continuous operations; and (2) the *mule*, in which a certain length of roving is first drawn out, which portion is then twisted and wound on cops. When two strands of yarn are subsequently twisted together, the product is called doubled yarn or thread.

The variety, complexity, and ingenuity of the numerous machines employed in C.-S. would form a sufficient subject for many volumes. The three men to whom C.-S. owes its greatest advance were Arkwright, Hargreaves, and Crompton (q. v.). Very full practical details of this most important art will be found in Mr Evan Leigh's *Science of Modern C.-S.* (2d ed. Manchester, 1873).

The degree of fineness of cotton yarn is estimated by the number of hanks, each measuring 840 yards, which will weigh 1 lb. Thus a hank of 40's means a hank which weighs one-fortieth part of 1 lb. Commercial numbers range from 6s to 250's, but as high as 10,000's has been spun, and Mr T. Houldsworth of Manchester exhibited in the Great Exhibition of 1851 spun yarn of various degrees of fineness to 2150's, and a fragment of muslin woven of 5408's.

The following table contains a summary of cotton factories, as exhibited in a parliamentary return, dated August 1875:—

	Number of Factories.	Number of Carding Machines.	Number of Combing Machines.	Total Number of Spinning Spindles. Running and Standing.	Total Number of Doubling Spindles. Running and Standing.	Total Number of Power-Looms. Running and Standing.	Number of Power-Loom Weavers	Number of Persons Employed. Number of Children under 13 Years of Age. Males	Number of Children under 13 Years of Age. Fem.	Number of Males between 13 and 18 Years of Age.	Number of Females of 13 Years of Age and above.	Number of Males above 18 Years of Age.	Total Number of Persons Employed. Males.	Females.	Total Males and Females.
ENGLAND AND WALES:—															
Factories employed in spinning	1,172	37,491	2,486	21,449,102	3,692,651	...	...	13,637	10,255	14,937	68,722	37,213	65,787	78,977	144,764
Factories employed in weaving	600	...	...	...	...	170,665	56,845	4,614	5,849	5,363	45,980	19,831	29,808	51,829	81,637
Factories employed in spinning and weaving	610	30,183	230	14,585,130	332,232	260,724	92,496	15,023	16,464	16,550	109,791	52,245	83,818	126,255	210,073
Factories not included in either of the above descriptions	160	114	6	...	...	...	...	68	69	166	2,599	960	1,194	2,668	3,862
Total	2,542	67,788	2,722	36,034,232	4,024,883	431,389	148,341	33,342	32,637	37,016	227,092	110,249	180,607	259,729	440,336
SCOTLAND:—															
Factories employed in spinning	41	1,738	160	686,678	319,326	...	...	165	426	422	9,625	1,734	2,321	10,051	12,372
Factories employed in weaving	33	...	...	...	...	13,596	6,977	19	15	273	8,209	955	1,247	8,224	9,471
Factories employed in spinning and weaving	22	1,364	4	686,776	18,434	15,575	7,145	59	72	429	11,639	1,610	2,098	11,711	13,809
Factories not included in either of the above descriptions	9	9	...	...	...	...	...	12	3	32	285	120	164	288	452
Total	105	3,111	164	1,373,454	337,760	29,171	14,122	255	516	1,156	29,758	4,419	5,830	30,274	36,104
IRELAND:—															
Factories employed in spinning	4	102	15	66,608	2,944	...	...	...	6	58	294	94	152	300	452
Factories employed in weaving	3	...	...	...	...	1,746	770	...	...	131	814	199	330	814	1,144
Factories employed in spinning and weaving	1	165	...	41,478	430	812	399	75	69	196	709	430	701	778	1,479
Factories not included in either of the above descriptions	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	8	267	15	108,086	3,374	2,558	1,169	75	75	385	1,817	723	1,183	1,892	3,075
Grand total of cotton factories,	2,655	71,166	2,901	37,515,772	4,366,017	463,118	163,632	33,672	33,228	38,557	258,667	115,391	187,620	291,895	479,515

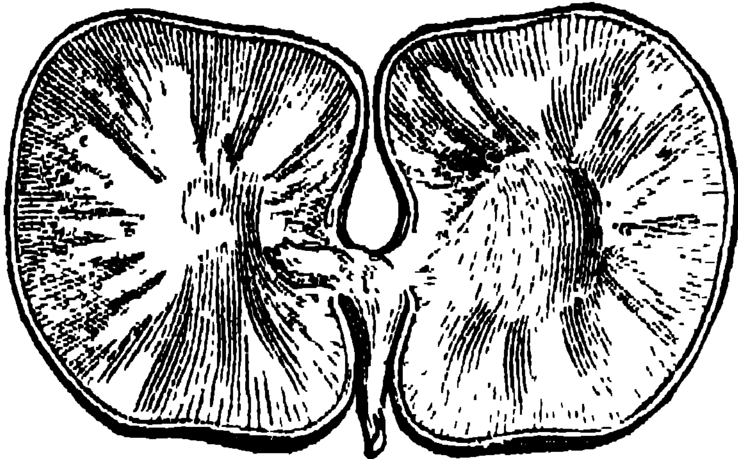
Cotton-Weed (*Diotis maritima*), a plant belonging to the natural order *Compositæ*, a native of the S.E. shores of Europe and of N. Africa. It gets its name from its leaves being clothed with dense greyish hairs, which look like wool.

Cottonwood. See POPLAR.

Cott'us, a genus of Teleostean fishes, including the species known as 'Bullheads' (q. v.), some of which are marine, whilst others inhabit fresh water. They belong to the family *Triglidæ* or Gurnards, and are remarkable for the large size of the head, which is provided with formidable-looking spines and processes. The sea-scorpion (*C. scorpius*) and the father-lasher (*C. bubalis*) are common British species. They can live out of water for considerable periods. Their average size is from 6 to 10 inches.

Cotur'nix. See QUAIL.

Cotyle'don (Gr. 'cup or hollow-shaped'), a part of the embryo of Plants (q. v.); also a genus of shrubs and herbaceous plants belonging to the natural order *Crassulaceæ*. *C. umbilicus*, the navelwort, pennywort, or pennypies, is a common plant in the W. of England, and in some parts of Wales. Several species, especially those of the Cape of Good Hope (*e.g.*, *C. orbiculata*), are frequently cultivated. *C. lutea* is a native of Portugal, but very doubtfully of Britain.


Two Cotyledons of a Bean.

Couch'ant (Fr. *coucher*, 'to lie down'), in heraldry, a lion, or other beast, lying down with his head erect. See DORMANT.

Couch-Grass, Wheat-Grass, Dog-Grass, Quickens, Squitch, or **Quitch**, the two latter names being also given to other grasses (*Triticum repens*), a perennial species of grass, belonging to the same genus as wheat, common in Europe and N. America. Being from its long, spreading roots difficult to be eradicated, it is a troublesome weed in cultivated grounds. C. is useful in binding sandy soils together, but though the roots are sweet and mucilaginous, and used in Naples for feeding horses, and even for making into bread in times of scarcity, and for brewing a domestic beer valued as a diuretic and diaphoretic, the foliage is not greatly esteemed as a feeding material. Its leaves, probably owing to a volatile oil, have a pungent flavour, and act upon dogs, at least, as a powerful emetic. *T. repens*, owing to its changeableness in different soils and localities, has been split up by some botanists into a number of very doubtfully distinct 'species.'

Couch'ing. See CATARACT.

Cou'cy, Renaud, Castell'an of, a *trouvère* of the N. of France, of whose life nothing more is definitely known than that he lived about the 12th c., and was a crusader, probably with Richard Cœur-de-Lion and Philippe Auguste. He is known for his extremely passionate and beautiful love-poems or *Chansons*, an admirable edition of which was published by Michel, Paris, in 1830.

Coue'pia, a genus of plants of the natural order *Chrysobalanaceæ*, comprising about a dozen species, all natives of S. America. The fruits of many of them are eaten—*e.g.*, that of *C. Chrysocalyx*, planted near the villages of the Amazonian Indians. The Indians use the bark of *C. Guianensis* in the manufacture of pottery.

Cou'gar. See PUMA.

Cough'ing is a symptom of irritation in the respiratory passages, or in the respiratory organs themselves. This irritation may depend upon a variety of causes, and it is a symptom of several diseases entirely distinct from each other. C. may be spasmodic, depending on a state of nervous irritability, without any obvious exciting cause; or it may be occasioned by pressure on the lungs from obesity, enlargement of the liver and spleen, the gravid uterus, abdominal tumours, and the like. C. may also be caused by the inhalation of irritant matters, brought into contact with the fauces, trachea, or bronchial tubes. Severe and prolonged C., not unfrequently simulating the symptoms of organic disease of the lungs, is often caused by enlargement and elongation of the uvula, the result of inflammation of that organ, the irritation being caused by the uvula tickling the adjacent parts. C. may also depend upon the absence of the normal amount of mucous secretion in the respiratory passages, and when such is the case, it is not followed by expectoration; or it may be caused by an excess of mucous secretion, as in ordinary catarrh and bronchitis. C. is also a symptom of such diseases of the lungs as pneumonia and phthisis; and of such local affections as croup, diphtheria, and whooping-cough. The C. of asthma is usually accompanied with distressing dyspnœa. In many diseases C. is a secondary symptom, owing to the respiratory organs being affected in connection with the general constitutional derangement. When it depends on acute or subacute inflammation, it is accompanied with febrile symptoms, as in bronchitis, pneumonia, and frequently in phthisis; but when chronic, or depending on local irritation only, there may be no pyrexia. By stethoscopic and other means of diagnosis, the nature of the disease, the seat thereof, and the extent to which the lungs are implicated, can always be determined. C., in all cases, is an effort of nature to relieve itself from a source of irritation.

Coulomb', Charles Augustin de, a well-known French physicist, was born at Angoulême, June 24, 1736. His fame rests upon his experimental researches in electricity and magnetism, especially his discovery of the law of the inverse square. (See TORSION BALANCE.) Through the influence of the projectors of a canal in Bretagne, C. was imprisoned for a time on account of his unfavourable report of the scheme. In 1786 he became a member of the Academy of Sciences, and in 1806 of the Institute. C. died August 23, 1806. His principal literary productions are his memoirs *Sur les Aiguilles Aimantées* (1779), *Sur la Statique des Voûtes* (1779), and *Sur la Chaleur* (1804).

Cou'marine is a crystalline substance contained in the Tonka bean (*Dypteryx odorata*), in woodruff, and in several other plants. It may be obtained by extracting Tonka beans with boiling alcohol, and evaporating the solution till it crystallises. C. has a pleasant aromatic odour; its taste is burning. When heated it melts, and may be volatilised unchanged. C. has been prepared artificially. Its composition is represented by the formula $C_9H_6O_2$.

Coun'cil, in the New Testament, signifies the Jewish Sanhedrim (q. v.). The clergy of a city or district, presided over by one of their own number as moderator, formed a consistorial court or C. of one Church. Of this nature was the meeting of the Church at Jerusalem recorded Acts xv., which is sometimes called the first Christian C. In the 3d c. the moderator was developed into a Bishop (q. v.), who presided over the councils of the presbyters of his diocese. An ecclesiastical C. proper, however, is a meeting of delegates from a number of confederate Churches. The custom of holding such councils began among the Greeks, who were accustomed to hold similar assemblies (synods) in connection with a political confederation of cities; and from them it was extended throughout the whole Church, the meeting receiving in the West the Latin name of C. At first the councils were merely provincial, and had very limited powers; the bishops and presbyters came as the representatives of their churches, and were presided over by a Metropolitan (q. v.). The earliest councils of this kind of which there is authentic notice were those which met concerning the Montanists, about 170. These councils having thus come to be regarded as the highest ecclesiastical tribunal in the several provinces, when the Church was established and consolidated under Constantine, it was easy to extend the idea to the whole Roman Empire, and the Emperor summoned a general or Œcumenical C. (q. v.) to discuss matters affecting the whole Church or the general principles of Christianity. The authority of convening general councils in the East was exercised by the Emperors; the Popes afterwards exercised the same power in the West.

The four general councils recognised by all Churches are those of Nicæa (325), of Constantinople (381), of Ephesus (431), and of Chalcedon (451). The chief subject discussed at these four was the doctrine regarding the person of Christ. The first condemned Arius (q. v.), who denied the proper divinity of Christ, and decreed his *true* Godhead. The second condemned Apollinaris (q. v.), who gave to Christ only an incomplete human nature, and decreed his *perfect* manhood. The third condemned Nestorius (q. v.), who separated Christ's two natures, and decreed that he was God and man *indivisibly*. The fourth condemned Eutyches (q. v.), who confounded Christ's two natures, and decreed that he was God and man *distinctly*. The Greek Church recognises other three in addition to the above: II. Constantinople (553), at which Origen was condemned; III. Constantinople (680), at which the Monothelites (q. v.) were condemned; II. Nicæa (787), at which image-worship was established. The Church of Rome recognises, in addition to these seven, other eleven: IV. Constantinople (869); I. Lateran (1122), II. (1139), III. (1179), IV. (1215), at which Pope Innocent III. forbade the formation of new orders of monks; I.

Lyons (1245), at which Innocent IV. declared Friedrich II. unworthy of the imperial throne of Germany; II. Lyons (1274), remarkable for the new regulations it enacted for the election of the Popes, including the shutting up of the cardinals in conclave; Vienne (1311), at which the Beghards and Beguines (q. v.) were condemned and the Knights-Templar suppressed; Florence (1439), which was chiefly occupied in settling the disputes between the Greeks and Latins; V. Lateran (1512), called by Pope Julius II. in opposition to that of Pisa; Trent (1545), convened to settle the controversies with the Protestants. The French divines, however, substitute for the Councils of Lyons, Florence, and V. Lateran, those of Pisa (1409), by which the *two* contending Popes were excommunicated; Constance (1414), at which the discord between the *three* contending Popes was extinguished; and Basel (1431), which discussed the union of the Greeks and Latins, and the reformation of the Church.

Besides these general councils, called by the Emperors and the Popes, many local councils were held, at which the bishops freely expressed their opinion, and often gave decisions opposed to those of the Popes; for it was long till the Church of the West especially could be brought to regard the decisions of the Roman Bishop as final. Of these local councils the chief are: Constantinople (754), called by Constantine (son of Leo the Isaurian) against image-worship; Frankfurt (794), called by Charlemagne against image-worship; Constantinople (842), which restored image-worship; Constantinople (861), called by some of the Greeks a general C.; Constantinople (879), which confirmed image-worship, and is held by some of the Greeks to be the eighth general C.; Placentia and Clermont (both 1095), at which Urban II. recommended the first crusade; Pisa and Milan (1511), called by Louis XII. of France to oppose Pope Julius II. The most important Protestant councils have been the Synod of Dort (q. v.) in 1618, which condemned Arminianism, and the Westminster Assembly, which met in 1643 to aid the English Parliament in settling the government, worship, and doctrines of the Church of England. See Neander's and Mosheim's *Kirchengeschichte*, Whately's *Kingdom of Christ*, Gieseler's *Compendium of Eccl. Hist.*, Guericke's *Manual of Church Hist.*, Hefele's and Walch's *Geschichten der Kirchenversammt.*, Walcot's *Sacred Archæology*, and Michaud's *Discussions sur les Sept Conciles Œcumeniques* (Bern, 1878).

Council, Privy. See PRIVY COUNCIL.

Council, Town. See TOWN COUNCIL.

Council of War, is a conference during war of general officers, or of the superior officers of a detachment, to advise with the commander. The British military code leaves the taking of this advice to the discretion of a commander; but the French code makes special provision for it, especially as regards the defence of a garrison. In the navy, flag-officers only are considered qualified to take part in a C. of W.; but officers of a lower rank are sometimes invited.

Coun'sel. See BARRISTER, ADVOCATE.

Count, or County (Lat. *comes*, Fr. *comte*), formerly an official, but now merely an honorary title, used on the Continent, and corresponding to the English Earl (q. v.) and the German Graf (q. v.). On the breaking up of the Roman Empire, the title *Comes* (q. v.) was retained in the new European kingdom, and under Charlemagne was applied both to military and civil officials. In France, where the C. of the palace ranked next to the mayor of the palace, the various Counts or governors of provinces were enabled, as the Karoling dynasty grew weaker, to acquire jurisdictions independent of the crown, and to make their titles, which they took from their respective possessions, hereditary. Thus arose the powerful Counts of Champagne and Toulouse, independent sovereigns, who appointed Counts under them, who are known as *Counts-palatine.* After the 12th c. the power of the French Counts decreased, the division of the country into counties was destroyed, and since the French Revolution C. has been merely an honorary title. In England, the Norman successors to the possessions of the English Earls were, for a time, known as Counts. Hence the wife of an Earl is still called a *Countess.* C.-palatine was, in England, applied to the noble or churchman (such as the Earl of Chester and the Bishop of Durham) who exercised royal prerogatives within his county.

Count and Reck'oning is the name given in Scotch law to a form of process by which one party may compel another to account with him judicially, and to pay the balance which may be found due. In these actions, a remit is usually made to an accountant. See ACCOUNTANT; ACCOUNTANT, CHARTERED.

Coun'ter-Approach', in defensive military engineering, a trench leading towards the besiegers from the covered way of the fortified place, and frequently ending in a small redoubt or battery. Its object is to get a point from which to enfilade the trenches of the enemy, and thus keep the fighting farther away from the besieged fortress.

Counter-Changed, in heraldry, describes a field divided in such a manner that it is tinctured in part with metal, in part with colour, the charges being reciprocally of the same colour and metal.

Coun'terfeit. See COINING.

Coun'terforts, in fortification, are buttresses of brick or stone, built against the revêtment wall, to resist the outward pressure of the rampart, or the natural ground on the opposite side of the ditch. Their depth is usually equal to the mean thickness of the revêtment, and they are placed about 18 feet apart.

Coun'terguards, in fortification, are small outworks, with parapets and ditches, occasionally constructed to cover the bastions and ravelins of a fortress. They run parallel to the faces of these interior works, and their crest is 3 or 4 feet lower than theirs, so as not to obstruct the defence, when the enemy has made a lodgment on the counterguard. The rear parapet never exceeds 18 feet, that there may not be space to establish a battery there when a lodgment has been made.

Counter-Irr'itants are medicinal agents having the property of irritating that part of the body to which they are applied, and of thereby exciting a curative influence on diseased parts or organs. They are chiefly used to modify the vascularity and nutrition of diseased parts, and to control congestion and inflammation, on the hypothesis that the production of artificial irritation on a sound part of the body affords relief to a part or organ previously diseased. Such agents have been employed by physicians from the earliest times. They are divided into three classes, viz., *rubefacients*, *epispastics*, and *caustics* or *escharotics*. The first class reddens the integument by dilating its capillary vessels; the second class disturbs the arrangement of its organic constituents, and consists of blistering agents, which cause an elevation of the epidermis with a secretion of serum beneath it, and those which produce a pustular eruption; the third class destroys the organisation of the tissues to which they are applied. The more prominent effects of C.-I. are purely mechanical, an artificial inflammation being produced which, when duly regulated, palliates or cures those which arise primarily or idiopathically, the blood being withdrawn from the congested or inflamed part, and accumulated in that to which the irritant is applied. C.-I. are applicable chiefly to cases of pain, congestion, or inflammation, the cause of which is confined chiefly to the affected parts, and they have but little influence upon the local developments of idiopathic general diseases, as fevers or dyscrasiæ. They are of advantage at the early stage of diseases, when there is local determination of blood, but not during the stage of febrile action. When the intensity of the febrile action has subsided, as indicated by the pulse being softer and less frequent, the appropriate time has arrived for the application of C.-I. to obviate the effects of inflammation, and the less the extent of the disease the more amenable it is to this mode of treatment. As a general rule, persons of a nervous and irritable temperament, as delicate females and young children, are not benefited by C.-I. unless applied mildly and with much caution; for the delicacy and fineness of the skin renders them intolerant of pain, and an injudicious application may result in general nervous derangement, inflammation, and even gangrene of the parts on which they act. None but the milder forms of cutaneous irritants should be applied to persons who have a fine and delicate skin and great nervous susceptibility, more especially to infants and young children. Some modern physicians deny the efficacy of medicinal C.-I. Professor Hebra of Vienna maintains that all such measures are irrational, useless, and cruel, and in this opinion he was followed by the late Dr Anstie. The value of C.-I., judiciously applied, is supported, however, by the

experience of many centuries, and they occupy a high place both in domestic and scientific medicine. The principal C.-I. are acid sulphuricum, ammonia, tartar emetic, aqua fervens, cantharides, capsicum, croton oil, moxa, sabina, setons and issues, mustard, succini oleum, turpentine. By the application of irritant ointments to a blistered surface, the counter-irritant action may be kept up for any length of time desired.

Coun'ter-Marching. See MARCHING.

Coun'termines, in military engineering, are chambers or galleries excavated by the defenders of a fortified place to intercept the mines, discover the mining, or destroy the works of the besiegers. Listening galleries are effective means of defence, since the sound of a pickaxe can be heard 60 feet through the ground, and are always provided in a large fortress, also envelope and counterscarp galleries, and passages for communication. The countermining was a remarkable feature of Major Inglis's heroic defence of Lucknow in 1857.

Coun'ter-Pas'sant, in heraldry, describes two lions, or other beasts, passing each other in contrary directions.

Coun'terpoint ('point against point') is, in music, the accompanying of one melody or theme with others. Originally this was the only form in which any melody was harmonised, while in modern music (excepting in church-music and oratorios) it has been to a great extent superseded by harmony, which relies for its effect rather upon the construction and progression of the whole chords than upon the movement of the different separate notes of which each consists. There are many treatises on C., the authors of most of which seem to have taken as great delight in devising combinations possessing no merit but ingenuity, as in fostering the beauty of their art. The art of C., as described in these works, is highly complex and artificial, hemming the composer round with all sorts of restrictions, but at the same time its study is an essential part of a musician's education, just as in many other branches of knowledge the learner is compelled to work under strict rules at first, in order to give him greater freedom in his original work afterwards.

Coun'ter-Proof, in engraving, an impression obtained from a proof, while it is still wet from the plate, by laying it on a sheet of paper, and passing them through a press. The design on the C.-P., being the reverse of the proof, is in the same direction as that on the plate, and is made chiefly as a means of judging of the success of the engraver's work.

Coun'terscarp, in fortification, is the wall of a ditch on the besiegers' side, the wall next the body of the fortress being the escarp or scarp.

Coun'tersign, in military language, is a watchword given daily by the commander of an army during actual warfare or manœuvres, the pronouncing of which is a warrant for being allowed to pass the sentinels as a friend. It is generally some simple word. In diplomatic language, the C. is the signature of a secretary to the charter of a king, prelate, or other superior, as a certificate of its authenticity. In the middle ages, common additions to the C. are *obtulit, recognovit, relegit et subscripsit.*

Coun'ter-Ten'or, a male voice singing—mostly in *falsetto*—the alto part. The C.-T. takes the upper part in male-voice music, and sometimes the alto in mixed choruses. For this latter purpose it must be entirely condemned, for it is artificial, hard, and quite wanting in that freshness which characterises the true alto voice of women and boys.

Coun'ter-Vair, in heraldry, is one of the Furs (q. v.). Vair exhibits azure and argent shields or bells in horizontal rows, with the bases or points of the tinctures touching on each other. C.-V. shows the same objects with azure touching on azure and argent on argent. See HERALDRY.

Countervalla'tion, in siege operations, is a chain of redoubts all round a fortified place to hinder the sorties of the garrison. The redoubts are either isolated or connected by earthworks. A similar chain of redoubts to protect the besiegers from external attack is a Circumvallation (q. v.).

Coun'ties in England and Scotland are the same as shires. (See SHIRE.) C. are districts into which the country is divided for purposes of government and administration of justice. Each county in England is ruled by its Sheriff (q. v.). Lancaster and Durham are *C.-palatine*, which were invested with an independent jurisdiction. Certain cities and towns, with land and territory annexed, having liberties and jurisdiction by grant from the crown, are called *C. corporate.*

Coun'try Dance (a corruption of the French *contredanse*), a dance popular in England, and so named from the different couples being arranged face to face. It is a species of quadrille, and has appropriate figures and music.

County Courts. The old C. C. of England, kept by the sheriffs, before the superior courts of Westminster were erected, were the chief courts in the kingdom. Their powers were greatly reduced under Magna Charta, and their jurisdiction limited to determination of trespasses, and of debts under 40s. The dilatory and expensive proceedings of these tribunals, and of various local courts for the recovery of small debts, led to the establishment, in 1846, of the present C. C., with more efficient and definite powers.

In England and Wales there are 502 courts, divided into fifty-nine circuits, and presided over by sixty judges. These are appointed by the Lord Chancellor. Each must be a barrister of seven years' standing. Their salaries are all about £1500 a year. To each court there is attached a registrar, who is appointed by the judge, but removable by the Lord Chancellor for misconduct. The registrars are paid according to the number of plaints entered in their districts. Their emoluments range from £50 or so to about £700 a year. There are twenty-three treasurers, who superintend the accounts. These are appointed and removable by the Lords of the Treasury, their salaries being £700 and £850 a year. The property in court is vested in them.

If a cause involve more than £5, a jury may be demanded by either party, or if it does not exceed £5, the judge may grant a jury trial. Under order of the judge, and with the consent of both parties, the issue may be settled by arbitration. Judgment in the C. C. is final, unless the subject of it exceed £5 in value, and then the cause can only be removed with the consent of a judge of the superior court. By the Act of 1850 (13 and 14 Vict. c. 61), the jurisdiction of C. C. is extended to the recovery of any debt, damage, or demand not exceeding the value of £50, after deduction of an admitted *set-off.* See COMPENSATION.

An important enlargement was made in the powers of the C. C. in 1861, when an Act of Parliament gave them jurisdiction in bankruptcy in cases of Petition for Adjudication (q. v.) by the insolvent, when he states in the petition that his debts do not exceed £300. The Bankruptcy Act of 1869 gave to the C. C., except in London, a general bankruptcy jurisdiction. The Act of 1852, for the recovery of debts in the city of London and its liberties, has provisions similar to some of the principal provisions of the C. C. Acts.

County Rates are assessments in each parish of a county, assessed by the justices on the annual value of lands and tenements rateable for relief of the poor. They are applicable to payment of coroners' fees, maintenance of county buildings, prosecution of felons and vagrants, and other county matters. Acts relative to C. R. were consolidated and amended by 15 and 16 Vict. c. 81.

Coup, a French word, meaning 'a blow,' 'a stroke,' (old Fr. *colp*, from Low Lat. *colpus*, a contraction of *colapus*, from the classic Lat. *colaphus*), is known as the first word of certain expressive phrases which have become universally current. *C. d'état* signifies a stroke of policy; *C. de grace*, the stroke of mercy by which an executioner ends a condemned wretch's sufferings; *C. de main*, a military phrase, meaning a rapid, successful attack—literally a stroke of the hand; *C. d'œil*, a glance of the eye—quick, comprehensive observation; *C. de soleil*, sunstroke; and *C. de theatre*, a stage trick—surprising effects in real life as well as on the stage.

Couped' (Fr. *couper*, 'to cut off'), in heraldry, describes the head or any limb of a lion or any beast cut off smoothly, not torn off with a ragged edge, or, as the heraldists say, *erased*. *C. close* is applied to the same kind of charge when no part of the neck or trunk is left. The term C. describes also a cross, bar, bend, or other similar charge when it does not extend in any direction to the border lines of the shield.

Coup'le (Lat. *copula*), the name given by Poinsot to a pair of equal forces acting in dissimilar directions in parallel lines. Such a system has a zero resultant acting at an infinite distance, yet it does not balance, the motion generated being one of rotation. The shortest distance between the directions of the forces is termed the *arm*, and the product of either force into the arm the *moment*. The *axis* is a straight line drawn from a convenient point of reference, perpendicular to the plane of the C., and representing by its length and direction the magnitude of the moment and the direction of rotation. If the rotation be positive, the axis is drawn towards the side from which the C. is viewed; if negative, towards the other side. Hence a C., regarded from the direction in which the axis points, is one which produces a positive rotation, and thus the axis completely determines the C. both in direction and magnitude. The resultant C. of two given couples is that C. whose axis is the diagonal of the parallelogram formed by the axis of the two given couples in precisely the same manner as in the Composition of Velocities and Forces (q. v.). It is evident, then, that the forces acting upon a material system may be all reduced to a force, a C., or a force and C.; and the reduction may be so ordered that the resultant force acts perpendicular to the plane of the resultant C., in which circumstances each will produce the respective effects of translation and rotation as if the other were not present. For the investigation and demonstration of the fundamental propositions in the theory of couples, see Thomson and Tait's *Elements of Natural Philosophy*, Todhunter's *Analytical Statics*, Pratt's *Mechanics*, and Duhamel's *Cours de Mécanique*.

Coup'ler, a piece of mechanism in an organ, by means of which two keyboards, or one manual and the pedals, can be connected together.

Coup'let is the name given to any couple of consecutive rhyming verses, but is more strictly used to denote two rhyming verses of equal length and rhythm, embodying an idea usually of the nature of a proverb or aphorism—

> 'Great wits are sure to madness near allied,
> And thin partitions do their bounds divide.'

The C. is very frequently used by the old dramatists as the 'tag' or concluding passage of a speech, in which a train of thought is rounded off with rhetorical completion—

> 'I go, and it is done; the bell invites me.
> Hear it not, Duncan, for it is a knell
> That summons thee to heaven or to hell.'

Cou'pon (Fr. *couper*, 'to cut off'), a certificate or warrant of interest or dividend due, printed at the bottom of transferable bonds given for a term of years, and cut off and presented for payment by the holder. In Great Britain a C. must be stamped.

Courante', a lively dance in triple time. The C. frequently occurs as one of the movements in the Suites (q. v.) of the older composers.

Courbevoir', a town in the department of the Seine, France, on the left bank of the Seine, 5 miles N.W. of Paris, with manufactures of white lead and brandy, and a trade in wine, brandy, and wood. Pop. (1872) 9237.

Cou'rier (Fr. *coureur*, from *courir*, Lat. *currere*, 'to run'), as a servant of the Government, is the bearer of important despatches to and from ambassadors at foreign courts. The employment of such messengers is of great antiquity. The Persian *angaros*, or mounted C., was kept always in readiness at certain stages throughout the country, to carry the king's despatches. Among the Greeks the C. was *hemerodromos*, a man who could run all day. The Romans styled him *cursor*, 'runner.' The duties were performed chiefly on horseback. In the middle ages couriers were known as *trotarii*, 'trotters.' In the 17th and 18th centuries they were called *running footmen* in England. Couriers now proceed by steamer, rail, or hired carriage, as well as on horseback; generally speak several languages; are acquainted with routes and officials, and are furnished with credentials and money by Government. The term C. is also applied to a private attendant on travellers, who arranges for his employer's convenience on journeys. He usually speaks several languages, knows the best routes, hotels, and places and objects of curious interest. The wages of this kind of C. are from £8 to £10 a month, independently of travelling expenses, out of which he is supposed to pay his own bill at hotels.

Courier, Paul Louis, was born at Paris, 4th January 1773, of rich *bourgeois* parents, and after a successful study of Greek and mathematics, entered the artillery as scholar in the Camp of Chalons (1792). While serving in the army of the Moselle (1794-95), the 'army of England' (1798), and in the French occupation of Rome, C. found time to keep up his classical studies. He superintended the ordnance of Paris till 1801, translating in that period the chief orations of Cicero. In 1803 his *Éloge d'Hélène* (a work of Isocrates) was published. In 1805 he served in Italy, and took part in the conquest of the Two Sicilies, which gave an insecure throne to Joseph Bonaparte. In the midst of the guerilla warfare of the Sicilian peasants against the French general, Reynier, C. continued his studies and translations of Xenophon (the works upon Cavalry and Equitation). Misunderstandings with his superiors at various Italian stations caused him in 1809 to resign, although he returned to serve for a short time in the concluding campaign on the Danube. Soon after he made at San Lorenzo, Florence, the discovery of the manuscript of Longus, which he was afterwards stupidly accused of mutilating. In 1812 he settled in Paris, published his translation of the *Daphnis and Chloe* of Longus, and married in 1814. The management of his estate in Touraine brought him into contact with the absurd pretensions of the restored aristocrats. C. began his political writings by his famous *Pétition aux Deux Chambres*, and soon afterwards attached himself to the opposition journal, the *Censeur*. In 1821 his *Simple Discours* involved him in a political trial for insulting the court, resulting in a sentence of imprisonment. His *Pétition des Villageois qu'on empêche de danser* had nearly the same fate. On 10th April 1825 C. was assassinated on his estate of Veretz, in circumstances which have never been rightly explained. His exact and extensive learning, fine taste, powerful satire, and simplicity and directness of style, give him a high place among French literary men. In some respects he has been likened to Swift. His *Livret*, or memorandum-book, gives a valuable and humorous picture of French politics and society after the Bourbon restoration. His complete works were published in 4 vols (Par. 1834) by Armand Carrel, with an essay on his life.

Cour'land (Slav. *Kars*, Ger. *Kurland*), a Russian Baltic government, S. of Gulf of Riga, has an area of 19,550 sq. miles, and a pop. (1870) of 619,154. It is mostly covered with wood, consisting of beech, pine, alder, birch, and oak, and is in general level and full of lakes and marshes, the highest eminence being Silberberg, in the vicinity of Mittau, the capital, only 500 feet high. Distilleries and tilling form the most important sources of industry. The wealthiest and most intelligent of the inhabitants are Germans; the peasantry are for the most part Letts. The territory of C., taken under the protection of Poland in 1561, was merged in Russia in 1795. At one time it formed two duchies, the property of the Teutonic knights.

Cour'ses, in a ship, are the whole of the lower sails—*e.g.*, foresail, mainsail, mainstay-sail, &c.

Cour'sing is a mode of hunting hares by greyhounds. When a hare is started, it is allowed to get about 100 yards in advance of the dogs, which are then let loose from the 'slips,' or cords, held by the 'slipper,' and fastened to the dogs' collars. The judge keeps his eye on the dogs, and notes when any one makes what is called 'a point,' that is, causes the hare to turn or 'double,' as it is called, or otherwise gets a decided advantage over the rest. The victory is not *necessarily* adjudged to the dog which kills the hare, but to the one which makes most 'points.'

Court (Fr. *cour*, Old Fr. *court*, from Lat. *cohortem*, 'a yard, also in peasant speech *cortem*, according to Varro; allied to the Teutonic *garden*, *garten*, and *yard*), among the Franks and other Germanic tribes the country-house of a lord or chief, where also he administered justice. Later on it denoted the space enclosed by the buildings of a feudal castle; hence it came to be applied to those persons immediately surrounding the chief. In England, when we speak of 'the C.' we denote the family and household of the sovereign.

Court, Presentation at, or introduction to the sovereign, can

in England only be obtained by means of some one who has been already introduced. The distinction is valued as a stamp of character and social status, though not usually cared for by those who have distinguished themselves in science, literature, or art. The 'C.-dress,' which must be worn on the occasion, probably forms to some an objection to going through the ceremony. It is antiquated, fantastic, and expensive. There are special days, advertised in the newspapers, on which the Queen holds levées and drawing-rooms. The former is for the reception of men only; the latter chiefly for the reception of women. The greatest drawing-room of the year is usually held on the Queen's birthday. The names of those who wish to be presented must be sent in to the office of the Lord Chamberlain some days previously, that they may be submitted to the Queen. No man or woman of doubtful reputation will be received. Lists of presentations appear on the following day in the principal London newspapers. Any British subject who has been presented at the C. of his own sovereign has a right to be presented at any foreign C. by the British Ambassador. Tickets to see the ceremony may be had by application, accompanied with an introduction to the Lord Chamberlain, who will give requisite information.

Court of Judicature, Supreme, Acts 1873 and 1875 (England). The statute of 1875 is to amend and extend the Act of 1873, and is to be construed along with it, the Acts together totally changing the constitution of the supreme law courts of England. The new law came into partial operation on 1st November 1875. Notwithstanding the principal statute (1873) abolishing the appellate jurisdiction of the House of Lords, the right is to be reserved until November 1, 1876. What may ultimately be done with regard to this it is therefore at present (1876) impossible to say. The constitution of a *High C. of Justice* is declared. All actions which have hitherto been commenced by writ in the superior courts of Common Law at Westminster, or in the C. of Common Pleas at Lancaster, or in the C. of Common Pleas at Durham, and all suits which have hitherto been begun by a bill or information in the High C. of Chancery, or by a cause *in rem* or *in personam* in the High C. of Admiralty, or by citation or otherwise in the C. of Probate, shall be instituted in the High C. of Justice by a proceeding to be called an *action*. There are to be divisions of the C. called the Queen's Bench, the Common Pleas, the Exchequer, the Chancery, the Probate, Divorce, and Admiralty divisions. Her Majesty's C. of Appeal is also constituted by the Acts. There are to be five *ex officio* judges, and as many other judges, not exceeding three, as Her Majesty shall from time to time appoint. The *ex officio* judges are to be the Lord Chancellor, the Lord Chief Justice of England, the Master of the Rolls, the Lord Chief Justice of the Common Pleas, and the Lord Chief Baron of the Exchequer. The Lord Chancellor may, by writing addressed to the president of any one or more of certain divisions of the High C. of Justice, request the attendance at any time, except during the spring or summer circuits, of an additional judge from such division or divisions (not being *ex officio* judge or judges of the C. of Appeal), at the sittings of the C. of Appeal, and a judge to be selected by the division from which his attendance is requested shall attend accordingly. The London C. of Bankruptcy is not to be transferred to the High C. of Justice. No appeal on a final decree is to be pleaded before fewer than three judges. If the subject of appeal is an interlocutory decree or order, it may be pleaded before two judges, but not before fewer. New regulations are made respecting circuits, and the fixing and collection of fees in the High C. and C. of Appeal. There is to be no local Venue (q. v.) for the trial of any action, but when the plaintiff proposes to have the action tried elsewhere than in Middlesex, he shall in his statement of claim name the county or place in which he proposes the action shall be tried, and the action shall be tried in the place named, unless the judge order otherwise.

Court of Session is the supreme civil court of Scotland. It was instituted in 1532 by James V. Formerly it consisted of fifteen judges, who sat in one court; but by 48 Geo. III. c. 151, the judges were required to sit in two divisions, and by 1 Will. IV. c. 69, their number was reduced to thirteen—the Lord President, the Lord Justice Clerk, and eleven Ordinary Lords. The Lord President and three Ordinary Lords form the First Division, and the Lord Justice Clerk and the other three Ordinary Lords form the Second Division. The First and Second Division form what is called the *Inner House*. There are five permanent Lords Ordinary, each of whom holds a court; the courts of the Lords Ordinary forming collectively what is called the *Outer House*. The judgments of the Outer House are subject to the review of either division of the Inner House. The junior Lord Ordinary officiates in the Bill Chamber (q. v.) during session. The C. of S. is the only court in Scotland which has jurisdiction over heritage, or in questions affecting it. With a few exceptions, no action respecting Movables (q. v.), where the interest of the Pursuer (q. v.) is under £25, can originate in the C. of S. The judgments of inferior courts, except that of the small-debt courts (see SHERIFF), are mostly subject to the review of the C. of S.; and even when this power is excluded, it may interfere when the inferior courts deviate from statutory regulation. The judges hold their office *ad vitam aut culpam*. Their appointment is from the crown. No one can be appointed who has not served as an advocate or principal clerk of session for five years, or as a writer to the signet for ten. Either division of the court may call in the aid of the three judges of the other division, when equally divided in opinion. In cases of extreme difficulty the Lords Ordinary are also called in, and pleadings are heard before the whole court, or *in presence*, as it is called. Judgments of the C. of S. may be appealed against to the House of Lords within two years. See Professor Mackay's *Treatise on the Practice of the C. of S.* (Edinb. 1878).

Courtall'um, a town in the district of Tinnevelly, province of Madras, 700 feet above the sea-level, near the junction of the Eastern and Western Ghauts. From the salubrity of the atmosphere and the picturesqueness of the scenery, it is much frequented by invalids. Its flora is singularly rich.

Cour'tesy or **Cur'tesy of England.** When a wife dies seized in fee of an estate, having or having had living issue, her husband holds the estate during his life, and is called *tenant by the C. of E.*

Courtesy or Curialty of Scotland is the same right of a husband in Scotland, and dependent on essentially the same conditions.

In both countries the child must be the mother's heir; it consequently appears that C. falls to the husband as the father of the heir. In Scotland, the test of the child being born alive has been decided to be that it shall have been heard to cry, and this rule is still adhered to. It is an error to suppose that the right is peculiar to either nation.

Courtesy Titles are titles accorded by society to individuals who have no legal right to them. The term is chiefly used in connection with the titles assigned to the children of peers in Great Britain and in Ireland. The eldest son usually bears the second highest title belonging to his father, unless the inferior title is of the same name as the first, in which case, to prevent confusion, some other title belonging to the father is assumed, or the family surname with the prefix of 'Lord.' When there is no secondary title, as must be the case with barons, the eldest son has the courtesy title of 'Honourable.' In Scotland he is known as the 'Master of ——.' The younger sons and daughters of dukes and marquises have the courtesy title of 'Lord' or 'Lady' prefixed to their Christian name and surname. The younger sons and daughters of earls, viscounts, and barons are entitled 'Honourable.' Wives of baronets have the courtesy title of 'Lady,' but their sons and daughters bear no title. Members of the Queen's Privy Council are by courtesy 'Right Honourable.' Judges of the Court of Session in Scotland are addressed as 'Lord' on and off the bench. 'Esquire' (q. v.), though properly applicable to only a limited class, is now almost universally assumed. Ladies, who have acquired a title by a first marriage retain it by courtesy after a second marriage, though the husband have no title; but their rank is according to that of the second husband. No courtesy title raises the bearer above the rank of a commoner. The eldest son of a duke, or any son of any peer, may therefore sit in the House of Commons; so may an Irish peer, but a Scotch peer cannot.

Court Fool, a jester formerly attached to a court or royal household, whose business it was to help to make the time pass agreeably by facetious or extravagant remarks, which often pleased in proportion as they were personal. The institution of the office is of very ancient date, but the palmy period of the

C. F. was during the middle ages. He was distinguished by the shaven head, the peaked cap of divers brilliant colours, generally having bells attached to it, the cockscomb, the ass's ears, and a sceptre of some fantastic shape. He also wore a collar of extravagant dimensions, and a dress which varied with the taste or the caprice of his master. Some of these officials have obtained a name in history, and many of their facetiæ, which sometimes expressed shrewd practical counsel, and even considerable political sagacity, have been preserved. Of court fools who have become historical, among the best known are Triboulet, the jester to François I. of France, and his successor, Brusquet; Scogan, jester to Edward IV. of England; and Archie Armstrong, the last of his order at the English court, who flourished in the reigns of James I. and Charles I. Court fools survived longest in Russia, but are now extinct even there.

Court'hand, the old English style of handwriting, as distinguished from the modern or Italian style. It is so named because it was used in courts of law after it had been generally superseded.

Court-Martial is a court for trying naval and military officers for breach of naval or military law. No capital punishment can be inflicted by a military C.-M. unless nine of the thirteen judges concur. When the court does not exceed its power, there is no appeal against its sentence; but it requires to be ratified by the crown. See ARTICLES OF WAR, MUTINY ACT.

Cour'trai (Flem. *Kortrijk*, the Lat. *Cortoriacum* of the *Notitia*, afterwards *Curtricum*), a fortified town in the province of W. Flanders, Belgium, on the Lys, 28 miles S. of Bruges. It is connected with Ghent, Lille, and Tournay by railway, has fine churches and a splendid Gothic town-hall, manufactures of linen, lace, thread, tablecloths, has extensive bleaching and soap-boiling works, sugar-refineries, &c., and the finest flax in Flanders is grown in the neighbourhood. Pop. (1874) 26,641. The Battle of the Gold Spurs, so called from 700 gilt spurs being stript from the French knights slaughtered by the Flemings, was fought at C., July 11, 1302.

Courts, Law. For England, see the following articles:—ADMIRALTY COURT, ASSIZE; CHANCERY, COURT OF; COMMON LAW, COURTS OF (under which are *Courts of Queen's Bench*, *Common Pleas*, and *Exchequer*); COURT OF JUDICATURE, SUPREME, ACTS; COUNTY COURTS; CRIMINAL COURT, CENTRAL; DIVORCE AND MATRIMONIAL CAUSES COURT; LORDS, HOUSE OF; JUDICIAL COMMITTEE OF THE PRIVY COUNCIL; PROBATE AND WILLS, COURT OF; QUARTER SESSIONS, GENERAL. For Scotland, see ADMIRALTY COURT, COMMISSARY, COURT OF SESSION; LORDS, HOUSE OF; QUARTER SESSIONS, GENERAL; SHERIFF.

Courtyard. See FARM BUILDINGS.

Cou'sin, Victor, an illustrious French author, was born at Paris, 28th November 1792, of poor parents. He was educated at the École Normale, where he subsequently taught classics, till the inspiration received from Laromiguière decided him to teach philosophy at the Sorbonne under Royer-Collard. The retrograde policy of the Government of Louis XVIII. drove him into Germany, where he met Hegel and studied Plato and Proclus. He recommenced his lectures in 1828, and the courses delivered during that and the two following years were probably unequalled in popularity in modern times. To this his handsome figure and splendid eloquence greatly contributed. After the Revolution of July he entered the Council of Public Instruction, to which he presented his valuable reports on education (chiefly primary) in Germany, Prussia, and Holland. Created a peer of France, he did not cease to lecture on Aristotle at the École Normale, of which he was now director. He was Minister of Public Instruction in the Thiers ministry of 1840. His speeches in the Chamber of Peers, especially that on philosophy in the universities, earned for him a high reputation as a public orator. At the same time the amount of his literary work was enormous. His editions of Proclus, Plato, Descartes, De Biran, Abelard, his works on the philosophy of the 18th c., on the scholastic philosophy, on Kant, on Aristotle's metaphysics, his book upon Mme. de Longueville, and his edition of Pascal's *Pensées*, all contain valuable material. His most popular work in Great Britain is the *Discours du Vrai, du Beau, et du Bien.* C.'s theory that there are in every act of consciousness three fundamental elements, viz., an element of plurality, compounded of finite self and finite not-self, an element of absolute, infinite substance, and an element of relation between the finite and God, or effect and cause, has been criticised by Sir William Hamilton in the *Edinburgh Review*, and is of course rejected by all who think that the knowledge of God comes by inference from experience. It is these same elements which C. afterwards, in his *Cours* of 1828, attempts to trace in a philosophy of history, borrowed for the most part from Hegel; the spontaneous or instinctive stage of intelligence, which corresponds to the idea of infinity, passing gradually into the reflective or philosophical stage which distinguishes the three elements. The 'East' represents the infinite; the finite appears in Greece; their final harmony in the modern world. To this C. added a transcendental geography: he found that there was an *à priori* fitness in Asia and Europe as the scenes of human development. Similarly, war was only a violent concussion between particular ideas, which the belligerent nations conceived as universal and necessary. The same absurd optimism runs through his estimate of great men, and is, in fact, the foundation of what he has called the Eclectic system in philosophy. According to this system, sensualism should characterise the earlier, idealism the later, stages of history; the opposite being the fact. C.'s report on German education, and his *Projet de Loi* of 2d January 1833, have been ably discussed by Sir William Hamilton (*Discussions*). C., who died at Cannes, January 13, 1867, left a considerable school among the younger French thinkers, of whom M. Janet may be taken as a specimen. Jules Simon and Jouffroi have also been called his disciples, but the latter had much greater scientific capacity than his master, who was less a philosopher than an eloquent and learned *littérateur*, with a taste for philosophical subjects, and an unusual power of impressing his enthusiasm on his pupils. C.'s works were published in a collected edition (22 vols. Par. 1846–47).

Cous'ins, First. See AFFINITY, AGNATE, MARRIAGE.

Coutances', a town in the department of La Manche, France, at the confluence of the Soulle and Bulsard, with a fine cathedral, one of the towers of which has been fitted up as a beacon to ships in the English Channel. It has manufactures of drugget, muslin, and thread, with a good trade in grain and cattle. Pop. (1872) 7278. C. is the *Civitas Constantia* of the Romans, and was the see of a bishop in the 5th c. In the vicinity are the ruins of an ancient aqueduct.

Coutar'ea, a genus of Cinchonaceous trees of Guiana, &c., the bark of one of which, *C. speciosa* (*Portlandia hexandra*), is used as a substitute for cinchona.

Cou'thon, Georges, born at Orcet, in Auvergne, in 1756, became an advocate in the local court at Clermont, where, by his charitable and courteous character, he grew very popular. In 1789 he was president of the tribunal, and in 1791 was sent by his fellow-citizens to the *Assemblée Legislatif.* After the flight to Varennes, his opinions changed; he demanded the deposition of the King, and in 1791 became one of the most revolutionary members of the Assembly, and afterwards of the Convention, in which he gradually attached himself to Robespierre. He presided at the Lyons massacres, and established in Auvergne the system of requisitions, levy *en masse*, and revolutionary committees. At last, in 1794, he was comprehended with St Just and Robespierre in the same decree of arrest, and was executed 28th July of that year. Although lame through paralysis, C. was a powerful speaker from the 'Mountain.' He proposed the famous test of purgation for the Jacobin Club, and passed the terrible decree of the 22d Prairial (June 1794), extending the law of the *suspect*.

Cou'tras, a town in the department of Gironde, France, on the left bank of the Dronne, 27 miles N.E. of Bordeaux, which it supplies with flour, and with which it is connected by railway. Henri of Navarre, subsequently Henri IV. of France, defeated the army of the League before the walls of C., October 20, 1587. The red wine of C. is of considerable excellence. Pop. (1872) 1959.

Cov'enant (Heb. *berith*, Gr. *diathēkē*) is applied in Scripture to contracts both between man and man and between God and man, although it could only be applied properly to the first, since mutual obligations or conditions, and mutual advantages,

were implied. 1. The manner in which two parties entered into a C. was by taking an oath (Gen. xxi. 31, 32), in witness whereof was set up a memorial stone or a heap of stones (Gen. xxxi. 45, 46); they feasted together; or, the most solemn ratification of all, they cut one or more beasts into halves, laid the pieces opposite each other, and passed between them, as much as to say, 'May the fate of these animals fall upon him who breaks this C.' (Jer. xxxiv. 18-20; cf. Gen. xv. 8-10). 2. According to the anthropomorphic ideas of the Old Testament, covenants are also spoken of as made between God and man, as in Gen. xv. 8-18, and xxviii. 20-22; in the first of which passages, Jehovah is represented as passing between the pieces in the form of a flame of fire. On another occasion, when making a C. with Abram, he gave him the rite of circumcision for a sign, as he gave to Noah the rainbow. 3. In the New Testament (Epistles to Galatians and Hebrews), the old C. or testament made between God and his chosen people at Sinai, with Moses as mediator, is opposed to the new C. between God and his elect people, with Jesus Christ as mediator. 4. Some theologians distinguish three covenants:—(1) The C. of works, entered into between God and Adam when the latter was in a state of innocence, and representing all his posterity; the condition on the part of man being perfect obedience, the promise, life, and the penalty, death. (2) The C. of grace, corresponding exactly with the new C. of the New Testament, to which the parties are God and—not mankind generally, but—the elect. (3) The C. of redemption (deduced from Gal. iii.) between the first and the second persons of the Trinity, the former engaging to give the latter a certain number of redeemed sinners for his Church; the latter, to be their surety and substitute.

Covenant, in the law of England, is the agreement of two or more persons to do, or not to do, some specified act. It is created by Deed (q. v.). In a C. to do something, the action stipulated for must be lawful; and if the thing to be done be legally impossible, the C. is void. A man may bind himself not to exercise a special trade or profession within a particular place, but a general obligation in restraint of occupation is contrary to law, and void. See CONTRACT.

Covenant, National, the name of the religious protest, binding its subscribers to support the Scottish Presbyterian Church, drawn up by the Scottish clergy in 1630. It embodied the Scottish Confession of Faith of 1581, and arose from the effort of Charles I. to introduce an episcopal liturgy into Scotland. It was signed by all ranks of the community—nobles, gentry, clergy, and commissioners from burghs and towns—in the Greyfriars' Churchyard, Edinburgh. Copies were also sent to different parts of the country for subscription. The N. C. was ratified by Parliament in 1640, signing beginning February 28, 1638. See Davidson's *Historical Sketch Illustrative of the National Confession of Faith* (Edinb. 1849).—**Solemn League and Covenant** was a modification of the N. C., and bound the English Parliament in alliance with the Scottish Presbyterians. It guaranteed the preservation of the Scottish Reformed Church, and was adopted by the Parliament, September 25, 1643. Charles II. signed it, August 16, 1650, but repudiated it in 1661, when it was ordered to be burnt. The Scottish supporters of these covenants were known as Covenanters, and were engaged in various risings against the crown in the period between the Restoration (1660) and the Revolution of 1688. In 1712 the Cameronians, a section of the Covenanters, renewed the signing of the covenants; but the Church of Scotland does not require adherence to these documents from her members.

Cov'ent Gar'den, a corruption of *Convent Garden*, so called from being formerly the garden of Westminster Abbey, is the great fruit, flower, and vegetable market of London. The most interesting days for inspecting it are Tuesdays, Thursdays, and Saturdays, and especially on summer mornings as early as three o'clock. The market had a humble origin about 1656, in a few wooden stalls. C. G. gives name to the famous theatre (opened December 7, 1732) in the vicinity.

Coventry (the 'convent dwelling;' the termination *try* being the Cymric *tre*, 'a dwelling or town,' common in Cornwall and Wales), a town in Warwickshire, on the Sherbourne, a tributary of the Avon, about 18½ miles from Birmingham, and 6 from Kenilworth. It is a station on the London and North-Western Railway. Its churches of St Michael's, St John's, and Trinity are among the most beautiful in England. Many of the streets are built with oaken beams and projecting stories; in one the house is shown where Richard Baxter spent two years during the civil war. St Mary's Hall, built by Henry VI. for the Merchants' Guild, is a marvel for quaint carving in black oak, and has one of the few pieces of historical tapestry in England. At one time C. had a great woollen manufacture of 'yarn white stuffs,' which was ruined by the French calico trade. The silk and ribbon manufacture and watchmaking then became the local industries; both suffered greatly about 1817, when the repeal of the Statute of Apprentices introduced the sweating system and half-pay apprentices, and the workmen were as yet unable to secure the observance of their 'statement lists' of wages and prices. The ribbon trade now flourishes, greatly extended by steam machinery. In 1874 new sewage works were constructed. The most interesting antiquities are the old charitable mortifications and chantries, such as Bablalie's Hospital, Ford's Hospital, Bond's School, White's Trust, &c. It is not thought degrading to send an aged member of a family to these time-honoured institutions. The ancient walls of C. were demolished by the Royalists in 1662, the town having sent 200 men to Lord Brooke. The story of Godiva, the wife of Leofric, riding through the streets, though still preserved in the wooden figure of Peeping Tom, and an annual procession of people covered with ribbons, has no foundation in fact, being told for the first time by Matthew of Westminster 200 years after its alleged occurrence; it is probably a repetition of a similar Herefordshire legend. Leofric built the monastery which long formed the glory of C., its population falling from 15,000 to 3000 upon the dissolution of the monasteries. Before that it was called the Chamber of Princes, being a favourite residence of English kings. The *Parliamentum Indoctorum* (1404), so called because lawyers were excluded, and the *Parliamentum Diabolicum* (1459), for the attainder of Yorkists, were held in C. The bishopric of C., founded in 656, was in 1121 united with the see of Lichfield. St Katherine's, one of the oldest English guilds, belonged to C. Its purposes were to maintain a chaplain, to make loans, and to give alms in deserving cases, to help all the members generally, and to hold four feasts in the year; those committing any offence to be expelled. Many of the old trusts are quaintly expressed, as in *Bond's*, where lands, &c., are left 'for the maintenance of ten poor men, as long as the world shall endure, and a woman to look to them.' At the end of the 18th c. there was a burst of revolutionary enthusiasm at C., and a society for constitutional information was formed, which gave to Burke the title of 'Don Quixote of Despotism.' Pop. (1871) 37,670.

Coventry, Sir John, a member of the Long Parliament, and of Parliament in the reign of Charles II., who having fearlessly opposed the policy of the King, and having in a speech seemed to reflect on his amours, was assaulted by a band of bravoes from Whitehall, commissioned by the Duke of Monmouth, and had his nose cut to the bone, 21st December 1670. This outrage led to the passing of the Coventry Act, which rendered cutting and maiming a capital crime. The Act was repealed in 1828. C. died about 1682.

Cov'erdale, Miles, one of the earliest and most distinguished English Reformers, was born at Coverham, Yorkshire, in 1488. He was educated at Cambridge, and became an Augustine monk, but adopted the Reformation doctrines, and devoted himself to translating the Bible. C.'s translation of the whole Bible was published in 1535, where, is not quite certain, but probably at Zürich. This was the first complete version of the Scriptures printed in English. He also superintended the edition known as the *Great Bible* or *Cranmer's Bible*, produced in 1539. In 1551 C., who had been almoner to Queen Catharine, was promoted to the see of Exeter. Imprisoned on the accession of Queen Mary, but released through the intercession of the King of Denmark, he went to the Continent, where he assisted in the preparation of the celebrated Geneva translation (1557-60). (See BREECHES BIBLE.) After the accession of Elizabeth, C. was appointed to the rectory of St Magnus, London. He died 20th May 1567. The tricentenary of the issue of C.'s Bible was celebrated October 4, 1835.

Cov'erture is a term of English law denoting the legal status of a woman during her marriage. See DIVORCE, HUSBAND AND WIFE, MARRIAGE, DIVORCE AND MATRIMONIAL CAUSES COURT.

Covilha', a fortified town in the province of Beira, Portugal, with manufactures of cloth and hot springs, and built in the form of an amphitheatre. Pop. about 7000.

Cov'ington, a town of Kentucky, U.S., on the river Ohio, opposite to Cincinnati (q. v.), with which it is connected by a suspension bridge and ferries. It has manufactures of cotton, hemp, silk, tobacco and iron; and large establishments for packing pork, &c. Pop. (1870) 1997.

Cow. See Ox.

Cow'bane. (See HEMLOCK.) Also an American name for *Archemora*.

Cow'berry. See WHORTLEBERRY.

Cowbird (*Coccyzus Americanus*), also called the American yellow-billed cuckoo, belongs to the family *Cuculidæ*, of the order Scansores, and gets its name from its note, which resembles the word *cow*. It is found in the United States, and migrates northwards in spring. Stragglers have been found in Britain. It feeds chiefly on caterpillars, but also eats various berries. The colour of this bird is dark-brown with green hues. The quills of its wings are cinnamon colour, and the under parts pure white. Its average length is 12 inches.



Cowbird.

Cowbridge, a parliamentary borough in Glamorganshire, 11½ miles W. by S. of Cardiff, unites with Cardiff and Llantrissant in returning one member to Parliament. One gate of its ancient wall, built at the close of the 11th c., still remains. Pop. (1871) 1134.

Cowes ('coves,' Old Eng. *cofan*), **West**, a seaport in the Isle of Wight, 10½ miles S.S.E. of Southampton, attractive from its picturesque appearance, its fine hotels, and its being the rendezvous of the Royal Yacht Squadron. It has brass and iron foundries, roperies, and sail making establishments. Pop. (1871) 2489.—**East Cowes** is on the E. side of the estuary of the Medina, as W. C. is in the W. In the neighbourhood is Osborne House, a residence of Her Majesty. Pop. (1871) 2058.

Cowhage, Cowage, or **Cowitch**, the short brittle hairs which grow on the pods of *Mucuna*, a genus of plants of the order *Leguminosæ* (sub-order *Papilionaceæ*), natives of tropical Asia, Africa, America, and the Fiji Islands. C., when it sticks to the skin, causes great itching. Administered in treacle or honey, C. is used as a vermifuge for expelling the thread-worms. The pods of *M. pruriens*, *M. urens* (the ox-eye bean of the W. Indies), and *M. prurita* of the E. Indies, the chief species, are eaten in an unripe state. *M. pruriens* is the chief source of C. *C. cherry* is the fruit of *Malpighia urens*. New Zealand C. is *Biden spilosa*. The name is also applied to *Acidoton urens* and to *Tragia volubilis*.

Cow'ley, Abraham, son of a London grocer, was born in 1618. He wrote verses before he was twelve years old, and published his *Poetical Blossoms* on entering Westminster School, at the age of fifteen. When an undergraduate at Cambridge, he wrote the most of his *Davideis*. On the breaking out of the great civil war, C., a devoted Royalist, was driven from England, and served for some time as secretary to the banished royal family. In 1656 he returned to England, and studied medicine. After the Restoration he was rewarded by the free lease of a farm at Chertsey, worth about £300 per annum. He died at the age of forty-nine, July 28, 1667. Dr Johnson considered C. the best of the 'metaphysical poets,' as he named those poets who substituted fantastic analogies, intricate conceits, and misplaced learning for genuine poetic beauties. In this class of writers, however, Donne, rather than C., deserves the first place. C. possessed considerable, although perverted, poetic powers, as is proved by his delightful translations from Anacreon. C.'s essays are pleasanter reading than his poems, being full of learning, sound reflection, wit and humour, and written in a fresh and animated style. He wrote also a comedy, *The Cutter of Coleman Street*, and a *Discourse on the Government of Cromwell*. His works were edited by Hurd (2 vols. 12mo,. Lond. 1772). See Johnson's *Life of C.*

Cowley, Henry Richard Wellesley, first Earl, the only son of the first Baron Cowley, who was a younger brother of the great Duke of Wellington, was born 17th June 1804. His career has been entirely that of a diplomatist. Beginning as attaché at Venice in 1824, he filled various important posts until he became, first, British ambassador to the Germanic Confederation, and in 1852 ambassador at Paris. Along with Lord Clarendon, he represented Britain at the Paris Congress of 1856, and was created for his diplomatic services, in 1857, Viscount Dangan and Earl C. In 1865 he was made a K.G. Two years later he retired from his post at Paris. In 1870 C. was made D.C.L. of Oxford.

Cow-Parsnip (*Heracleum*), a genus of plants of the natural order *Umbelliferæ*, of which a number of species, widely diffused through India, Europe, and America, but rather difficult to distinguish, are known. Some are cultivated; but except *H. giganteum* of Siberia, which attains a height of 10 or 12 feet, none are in any way very remarkable. The common British species, the hogweed, or *Kiesh*, of Scotland (*H. sphondylium*), is used for feeding pigs, and in Scania in Sweden, in former times at least, was used as a domestic remedy. The leaf stalks of a Kamtschatkan species yield a sweet exudation, which is used in the preparation of a spirit. The roots and stems of *H. lanatum* are eaten by some of the American tribes, and the young shoots of *H. pubescens* are valued in the Caucasus as an article of food for the sweet and aromatic juice (Dickie). *H. panaca* and other Siberian species have been recommended for cultivation on account of the quantity of herbage which they yield early in the season.

Cow'pen Bird (*Molothrus pecoris*), a member of the Insessorial family *Sturnidæ*, is a native of the United States, and migrates N. and S. according to the season. Like the cuckoo, it deposits its eggs in the nests of other birds, the young C. B. being found by itself in the nest, as with the former parasite. It lives on the insects, &c., which it finds associated with cattle, and takes its name from this circumstance. The colour is dark-drab with green tints, the upper part of the breast being violet. The average length is 7 inches.

Cow'per, William, one of the most familiar English poets, was born on the 26th November 1731, at Great Berkhampstead in Hertford. He was of highly-connected family, his father, chaplain to George II., being nephew of the first Earl Cowper, Lord Chancellor. When six years old, C. was sent to a school at Market Street, where his shrinking sensitiveness exposed him to much suffering; but his life at Westminster School from 1741 to 1748 proved more happy. Law having been chosen for him as his profession, C. was articled to an attorney for three years, and afterwards, in 1754, called to the bar. He eschewed legal studies, however, and his Temple life was occupied with lighter literature. His father being dead, and his income scanty, he accepted in 1763 the offered post of reading-clerk to the House of Lords; but nervousness prevented him from appearing at the bar of the House for examination, and so he lost it. Reduced by this to despair, even insanity, he attempted suicide, and only moral cowardice hindered his purpose. After eighteen months passed in a private asylum at St Albans, C. went to live at Huntingdon, where he formed his friendship with the Unwins —a fortunate one for him. On the death of the Rev. Mr Unwin (1767), his widow removed to Olney, Buckinghamshire, and C. went with her, feeling that his happiness depended on this intimacy. Less beneficial was his intercourse with John Newton, whose stern influence actually led in 1773 to a renewal of the poet's mental trouble. Shortly before this he had begun the composition of his *Olney Hymns*. C.'s convalescence was occupied in gardening and the rearing of tame hares; while the cheerful society of Lady Austen—who suggested to him the inimitable *John Gilpin*, *The Task*, and the *Translation of Homer* —had a healthy effect on his mind. John Newton, besides, left Olney in 1779, in which year the *Olney Hymns* were published. The success of *The Task* (1785) was very great, and the *Homer* (1791) sustained its author's reputation, besides obtaining for him the sum of £1000. But his constitutional malady again returned. Seeking more cheerful scenes, he left Olney for Tuddenham in Norfolk, accompanied by Mrs Unwin.

This lady died in 1796, and C. being attacked by dropsy, expired at Dereham, Norfolk, April 25, 1800.

In English poetry C. was leader of a reaction against the brilliant, artificial school of Pope. He had neither deep passion nor imagination, but has won and kept his place by his purity of sentiment, his graceful and truthful handling of simple themes, his lucid and vigorous style, and especially by his earnest religious vein. Not excepting Milton, he is our truest religious poet. *The Task* is his greatest work; *Conversation* perhaps his cleverest. In the one he shows exquisite feeling; in the other, polished wit. *John Gilpin* has always been and must ever remain popular; while his *Letters*, with their charming *naïveté* and sparkling clearness, display an acute and cultured intellect, and entitle him to be considered one of the most charming letter-writers in the English language.

Southey has edited C.'s works in 15 vols. The best Life is that by Southey (1835). The Globe edition (Macmillan & Co., 1870) gives an account of the preceding literature on the poet.

Cowplant (*Gymnema lactiferum*), a native plant of Ceylon, of the natural order *Asclepiadaceæ*, gets its name from a belief that its juice supplied the place of milk to the natives; but in reality the juice is only *like* milk, not used as a substitute for it (Emerson Tennant).

Cow'ry (*Cypræa*), a genus of Gasteropodous mollusca, forming the type of the family *Cypræidæ*, in which the shell is convolute and enamelled; the spire is concealed; the shell-aperture narrow, and channelled at either end. The outer lip is thick and inflected in old shells. The foot is broad, and the mantle lobes meet over the back of the shell. The shells form typical examples of the kind of shells to which the name *Porcellanous* or 'Porcelain' is applied. A few species are British, but most are tropical. The money-C. (*C. moneta*) is so named from its being used as a substitute for coins in many parts of Asia and Africa. It is of yellowish colour, and averages an inch in length. In Bengal one C. = $\frac{1}{35}$ of a farthing in value. Other species are the *C. tigris*, *C. Scottii*, *C. argus*, *C. histrio*, *C. undata*, *C. Madagascariensis*, *C. Europea*, &c. The genus *Ovulum* is included in this family.


Cowry—*Cypræa Stolida*

Cow'slip (*Primula veris*), a common plant in many parts of England, though rarer in Scotland, belonging to the natural order *Primulaceæ*. The flowers are believed to possess sedative and diaphoretic properties, and are therefore sometimes used as an anodyne and antispasmodic, and when fermented as *C.-wine*, employed to produce sleep. The Virginian C. (*Dodecatheon Meadia*), a member of the same order, is cultivated in our gardens for the beauty of its flowers, which is indeed the main recommendation of its genus. The same name is sometimes applied to *Mertensea* or *Pulmonaria virginica*. The Jerusalem C. is *Pulmonaria officinalis*.

Cow-Tree, a name applied to various trees, the bland milky juice of which is used instead of milk. For instance, the Arbol de Leche, Palo de Vaca, of Caraccas and other parts of S. America, is *Brosimum Galactodendron* (or *Galactodendron utile*), one of the natural order *Artocarpaceæ*. The name is also applied to the Hya-hya (*Tabernæ montana utilis*), one of the *Apocynaceæ*, as well as to *Ficus Saussureana* and other species of figs, and to *Clusia Galactodendron*. The 'milk' of *Brosimum Galactodendron* is said to be of as good quality as that from the cow. The tree forms large forests on the sea-coast of Venezuela. The milk is obtained by making incisions in the trunk, and is perfectly wholesome and very nourishing, having an agreeable taste like cream, with a balsamic odour. Its composition is different from that of animal milk, containing, as it does, wax and fibrin, a little sugar, a salt of magnesia, and water. After a few days' exposure to the air it sours and putrifies. It contains upwards of 30 per cent. of the resinous substance called *Galactin*.

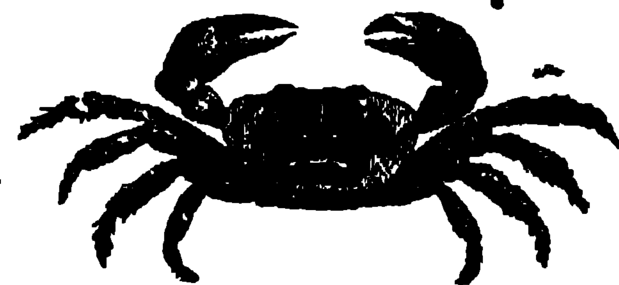
Cow-Wheat (*Melampyrum*), a genus of plants of the order *Scrophulariaceæ*, of which several are common in English woods, pastures, cornfields, &c. They get their name from a belief that they fatten cattle, and give a yellow tinge to butter made from the milk of cattle fed on pastures in which they abound. There are four British species. The generic name refers to an ancient belief that bread made from flour mixed with the ground seeds of C. had a tendency to become black.

Cox, David, after Turner, the greatest of English landscape painters in water-colours, was the son of a Birmingham blacksmith, and was born in 1793. At the age of fifteen he was employed by a locket and miniature painter, afterwards became scene-painter in the theatre at Birmingham belonging to Macready, father of the tragedian. In 1811 he went to London, where he struggled along industriously, giving lessons and occasionally selling a picture for a few shillings. At the age of thirty he became a teacher of drawing at a ladies' school at Hereford, with a salary of £100 a year; but nevertheless he found leisure in a single year to send twenty-two contributions to the Old Water-Colour Society. In all he exhibited 800 works at the Society of Painters in Water-Colours. At last fortune veered, and C., raised above immediate want, was at liberty to roam in search of the picturesque. He died 7th June 1859. Since his death there has been a rise in the price of his drawings, unequalled, perhaps, except in the single case of Turner. The strength of C. lies in his honest, downright English character. A master of space and aerial perspective, he paints the heaths and hedgerows of England under shifting aspects of shower and sunshine, wind and fog. He aims at depicting certain hours of the day, and such is his attention to atmospheric effect, that it has been said his drawings might be labelled 'stormy,' 'change,' 'fair.' If his art lacks imagination or passion, it raises no unsatisfied longings, for it fulfils its every promise. See *Life of D. C., with Selections from his Correspondence, &c.*, by N. Neal Solly (Lond. 1873), and a critical monograph by F. Wedmore in the *Gentleman's Magazine* of March 1878.

Coxe, William, a heavy but painstaking historical writer, was born in London, March 7, 1747; became fellow of King's College, Cambridge, 1768, curate of Denham, near Uxbridge, 1771, rector of Bemerton, 1788, and archdeacon of Wilts, 1805. He died June 8, 1828. His best known works are his *History of the House of Austria* (3 vols. Lond. 1807), and *Memoirs of John Duke of Marlborough* (3 vols. 1817-19). He also wrote *Memoirs of Sir Robert Walpole* and *Memoirs of the Pelham Administration*.

Coy'pu, or **Nu'tria** (*Myopotamus C.*), a genus of Rodentia, included in the Beaver family, *Castoridæ*, and largely hunted for its fur. It inhabits burrows made in the banks of rivers in Chili and elsewhere in S. America. The hind-feet are webbed, the tail being long and rounded, scaly, and provided with scattered hairs. It averages the size of the beaver—that is, from 2 to 3 feet. The muzzle is pointed and the ears small. The fur is of a general yellowish tint, and known by the name 'Racoondah.' In some years 1,000,000 of C. skins have been imported into Britain from S. America.

Crab (Old Eng. *crabba*, Sansk. *grabh*, 'to seize or grab'). The name applied popularly as well as scientifically to many genera of *Crustacea* (q. v.), included in the order *Decapoda* (q. v.) ('ten-limbed') of that class, and for the most part in the section *Brachyura*. In the true crabs, represented thus by the edible C. or 'partan' (*C. pagurus*), and the smaller or shore-C. (*C. mænas*), the abdomen is rudimentary, and is tucked up under the broadened-out body, which consists of the *cephalo-thorax*, or united head and chest segments. The gills are contained within special cavities existing in the sides of the body. The nervous system in the crabs consists of a single large ganglion, placed ventrally, or on the floor of the body, and from which nerves radiate throughout the body. During their development, crabs undergo a metamorphosis, the first stage being free-swimming, possessing a tail, and known as *Zoea*. The second stage, named *Megalopa*, is also tailed; whilst after several moults the *Megalopa* loses its tail and assumes the form of the perfect C. The antennæ are never of great length, and the front pair of legs form *chelæ* or nipping-claws. The eggs are attached to the rudimentary tail of the female.


Land Crab.

The sub order *Brachyura*, including the true crabs, are represented by the families *Canceridæ* (edible and other crabs, belonging to the genera *Cancer*, *Æthra*, *Xantho*, *Perimela*, *Galene*, &c.), *Maiadæ*, or Spider Crabs (q. v.), and *Oxystomidæ* (genera

Dorippe, &c.). *Ocypodidæ* (genera *Pinno-theres*, sea-crabs, and *Gecarcinidæ*, or land-crabs, &c.) contains the representative groups of crabs. The sub-order *Anomura*, in which the abdomen is developed to a greater or less extent, but not so perfectly as in the *Macrura*, includes the well-known Hermit or Soldier Crabs (q. v.), *Paguridæ*, the *Hippidæ*, the *Porcellanidæ*, or porcelain crabs, the *Dromidæ*, *Homolidæ*, and other groups. The abdomen in *Anomura*, whatever its development, does not bear the *feet* seen in the *Macrura* (lobsters, shrimps, prawns, &c.). The three front pairs of feet are well developed, and the first claws are generally chelete. See also CRUSTACEA, DECAPODA, and articles (such as PEA-CRABS, SPIDER-CRABS, &c.) descriptive of the various kinds of these crustaceans.

Crab-Apple, *Pyrus malus*; Queensland C.-A., *Petalostigma quadrilocularis*; Siberian C.-A , *Pyrus baccata* and *P. prunifolia*.

Crabbe, George, an English poet, was born at Aldborough, Suffolk, December 24, 1754. His father, a collector of salt-duties, encouraged his early poetic proclivities, and strove to procure him a good education. When fourteen years of age C. was apprenticed to a surgeon, but finding the profession distasteful, abandoned it and went to seek his fortune as an author in London. At the end of a year, being in danger of imprisonment for debt, he wrote asking help from Burke, who admitted C. into his friendship, enabled him to issue his poem, *The Library* (1781), and persuaded him to enter the Church. After being curate of Aldborough, C. received two livings in Dorsetshire, and removed in 1785 to Strathern Parsonage, where he remained until 1813. He spent the rest of his life at Trowbridge, Wiltshire, published his *Tales of the Hall* in 1819, and died February 8, 1832.

C.'s poetry describes commonplace themes with intense and sometimes painful realism. His characters belong to the humblest ranks—smugglers, poachers, paupers, vagrants—whose natures are analysed with startling, unsparing accuracy. He depicts scenes with tedious minuteness. Hazlitt said that C. described the interior of a cottage 'like a person sent there to distrain for rent.' C. has been called a Pope in worsted stockings. He has Pope's correctness without his nimble wit, fancy, and glittering delicacies of language. As he grew older, his verse became more passionate, touching, and forcible; it forms a link between the school of Pope and the school of Wordsworth. C.'s principal works are *The Library*, *The Village*, *The Borough*, *Tales in Verse*, *Tales of the Hall*, *Sir Eustace Grey*, *The Hall of Justice*. See *Life of C.* (1838) by his son.

Crab'eth, Dirk and **Wouter**, famous masters in the art of glass-painting, were brothers, and flourished during the latter half of the 16th c. They appear to have been born at Gouda, in S. Holland. Wouter died in 1581, and Dirk in 1601. The most splendid examples of their skill are the painted windows in St Janskirche, at Gouda, of which seven were executed by Dirk and four by Wouter. Other churches in Belgium and France possess excellent examples of their art. Although friends, these brothers were so jealous of their reputation, that each concealed from the other the processes by which they achieved their effects.

Cra'cow (Pol. *Krakov*, Ger. *Krakau*), capital of a circle in the crown-land of Galicia, on the Vistula, about 70 miles N.E. of Vienna by rail. It contains forty-six churches, four public squares, a castle called the Konigsburg, and a Gothic cathedral, with the tombs of the Polish kings. The University of C., founded in 1364, and for a time a famous seat of learning, was destroyed by the influence of the Jesuits, but was re-opened in 1817. It has a valuable library, a botanic garden, and a museum. C. has a theological seminary, a normal school, two gymnasia, a polytechnic school, a literary and musical association, and the national theatre. The streets are generally dark and narrow, but the thoroughfares in the suburbs—of which there are fourteen—are much wider and cleaner. The old walls have been converted into a promenade. There are no important manufactures, and the trade, formerly very extensive, became very insignificant till a transit trade with Russia, Prussia, and Austria, carried on by the Jews, revived while C. was a republic. The railway, which now connects the city with Vienna, Berlin, Warsaw, and Lemberg, has increased trade. Since C. came into the possession of Austria it has been surrounded by extensive and formidable fortifications. Jews farm about a fourth of the population, which was in 1870, 49,835. C. was founded about 760 by Krak, Duke of Poland, whence its name; was the capital of Poland from 1320 to 1609, and in it the monarchs were crowned until 1764. It was taken by Karl XII. of Sweden in 1702, by the Russians in 1768, added to Austria in 1795, formed into a republic in 1815, and finally united to Austria in 1846.

Craft, in naval language, is a term applied to any collection of decked vessels. It is a general designation for barges, lighters, hoys, and other keels employed in loading and unloading large ships. In the royal navy, cutters, schooners, gunboats, and other vessels commanded by lieutenants, are styled *small C.*

Crag, a local name given to certain Pliocene deposits in Norfolk and Suffolk, consisting of shelly sands and gravels. The Norwich or mammaliferous C. is used to fertilise soils which are poor in lime. See PLIOCENE.

Craig, John, a Scottish Reformer, was born in Scotland in 1512. Trained to be a Dominican friar, he was intrusted with the education of the novices of that order at Boulogne, when the reading of Calvin's *Institutes* converted him to Protestantism. Openly avowing his opinions, he was condemned to be burnt by the Inquisition, and was only saved by the riots consequent on the death of Pope Paul IV., in the course of which the prisons at Boulogne were thrown open. After many narrow escapes on the Continent, C. returned to Scotland, and became Knox's colleague in the parish church of Edinburgh. Even in that time and country he was distinguished for boldness of speech and action. He refused to proclaim the banns between Queen Mary and Bothwell, and when he was made minister to James VI, never refrained from saying to the 'anointed pedant' what he thought of his conduct. He aided in drawing up the *Second Book of Discipline*, and wrote the National Covenant, signed by the King in 1580. C. died December 4, 1600.—**Thomas C.**, a Scotch advocate, was born at Edinburgh about 1548, educated at St Andrews and Paris, filled various posts of distinction, including those of Justice-depute to Archibald Earl of Argyle, Justice-general of Scotland, and advocate for the Church of Scotland. He was at the same time a favourite of James VI., who offered him the honour of knighthood, which, however, he declined. C. is best known for his *Jus Feudale*. He also wrote respectable verses, and was an ardent champion of the claims of Scotland to be independent of England. T. C. died at Edinburgh, 26th February 1608. See Tytler's *Life of C.* (Edinb. 1823).

Craik, George Lillie, an English author, was born in Fife-shire in 1798. Educated at St Andrew's University for the Church, he betook himself at an early age to London and to literature. Among the works he produced at this period of his life were his *Pursuit of Knowledge under Difficulties*, his *History of British Commerce*, and, above all, his *History of Literature and Learning in England from the Norman Conquest to the Present Time* (1844). He also edited the *Pictorial History of England*, and contributed to the *Penny Cyclopædia*. In 1849, C. was appointed Professor of History and English Literature in Queen's College, Belfast, and among his writings subsequent to that appointment are his *English of Shakespeare* and *Outlines of the History of the English Language*, which have both been very popular. C. died June 25, 1866. He was a careful recorder of facts and a suggestive writer. His *History of English Literature* is in particular a collection of conscientious and sound criticisms.

Crail, a seaport in Fifeshire, 10 miles S.E. of St Andrews. Herring-fishing, once carried on here to a great extent, but which declined from the herring deserting the coast, has of late years much revived, and would increase were the harbour improved. C. unites with St Andrews, E. and W. Anstruther, Cupar, Kilrenny, and Pittenweem in returning one member to Parliament. Pop. (1871) 1126. The town was of note at an early period, and still possesses some vestiges of an old castle, once a royal residence, and of a priory college. From the square tower of the ancient parish church springs the broach, an architectural feature scarcely found in Scotland out of Fifeshire. Archbishop Sharp was at one time minister of C.

Crake (*Crex*), a genus of Grallatorial or Wading birds, belonging to the family *Rallidæ* or Rails. In the C. the bill is thick and shorter than the head. The wings possess a small spur. The common corncrake (*Crex pratensis*), or landrail,

is of a reddish-brown colour, marked with black or dark-brown. The tail is short and pointed. It is a migratory bird, being found in Britain only in summer, and inhabits cornfields and marshy lands, its harsh cry of *crek, crek*, being very familiar. It winters in S. Europe, N. Africa, and Asia. An analogous species is the Carolina rail (*C. Carolina*) of N. America, which inhabits marshes, and migrates northwards from the Gulf of Mexico in summer. In size and colour it resembles the corn-crake, its plumage being streaked with white.

Crambe, a genus of plants of the natural order *Cruciferæ* (q. v.), of which one, *C. maritima*, is well known as Sea-Kale (q. v.), found wild on our coasts, and also cultivated in gardens for use. When blanched as a potherb, it is eaten in the same way as asparagus. *C. tartarica* is the Tartar *kenyes* or Tartarian bread. It is not cultivated, but the root is eaten, either boiled or sliced, with oil, vinegar, and salt, in the countries of which it is a native. See Loudon's *Encyclopædia of Plants*, p. 557.

Cramps are a variety of spasms or hypercenesis, and are caused by the contraction or tension of a voluntary or involuntary muscular structure, independently of volition, and accompanied with pain. They are called *symptomatic* when they depend upon disease in other parts of the body than in the muscular tissues affected, as in affections of the brain and spinal marrow; and *idiopathic* when the disturbance is functional, depending on transient lesion of the nerves and their sheaths, or on hyperæmia with ædema of the neurilemma. C. are described as *tonic* when the muscular contraction is continuous, and as *clonic* when intermittent. They are caused—(1) By irritation at or near the seat of morbid action, such as from sudden change of temperature in bathing, exposure to cold, over-exertion of the muscles, or from bringing muscles long disused into action; (2) By irritation of the nerves supplying the affected muscles; (3) By irritation or lesion of the spinal marrow at or near the origin of the nerves supplying the muscles; (4) By lesion of parts of the brain; (5) By irritation of the digestive viscera, the generative and urinary organs, the action being transmitted to the external muscles; (6) By irritation of any of the senses, transmitted to their nervous centres, and thence reflected on parts connected with them. C. forms a prominent symptom in many diseases of infancy, in diarrhœa, dysentery, and especially in Asiatic cholera. They also occur during and after convalescence from certain acute and chronic disorders, as typhus, enteric and malarious fevers, Bright's disease of the kidneys, epidemic diphtheritis, &c. C. are relieved by friction combined with emollient, stimulant, or opiate liniments. See articles on SPASMS, CONVULSIONS, TETANUS.

Cran'ach or **Kron'ach** (originally *Sunder* or *Sünder*), **Lukas**, a famous German painter, born at Kronach, near Bamberg (Bavaria), in 1472, was appointed court-painter to Friedrich the Wise of Saxony in 1504, and was employed later by the House of Brandenburg and other great families. His versatility was shown by his buying an apothecary's business at Wittenberg, where he became Burgomaster, and afterwards engaging in the book and paper trade. C. allied himself to the cause of the Reformation, and painted with affectionate conscientiousness the portraits of his friends Luther and Melancthon. He died, 16th October 1553, at Weimar. Of his numerous works, which nearly all remain in Germany, the principal are altarpieces. His designs were Gothic, wanting in unity of idea and effect, and in his historical pictures it was his custom to introduce his own portrait, and those of his family and acquaintances. For colour, however, power of characterisation, and laborious execution, C. was one of the greatest artists of his time, though Dürer and Holbein were among his contemporaries. His chief work is the *Crucifixion* in Weimar church. His engravings on wood and copper are much sought after by amateurs. His son, **Lukas**, known as 'the Younger C.,' an excellent colourist and famous portrait-painter, died Burgomaster of Wittenberg in 1586. See Schuchardt's *Lukas C.'s des Aeltern Leben und Werke* (2 vols. Leips. 1851).

Cran'berry (*Oxycoccus*), a genus of plants of the natural order *Vacciniaceæ*, consisting of small, slender, or creeping evergreen shrubs. There are three species. *O. palustris*, common C., is frequent in peaty bogs and marshy ground of Britain, as well as in similar or mountainous localities in Europe, Siberia, and N. America. It is largely used in tarts, preserves, &c. Before the Lincolnshire bogs were drained, the berries were sold by the cartload in Norwich market. In the market of Langton, in Cumberland, as much as £20 to £30 worth of the fruit was sold for five or six weeks in succession, as long as the season lasted. In Sweden, silver plate is boiled in them, that the acid in the fruit may clean it.

O. macrocarpus is the large-fruited or American C., common in sandy soils from Canada to Virginia. Large quantities are used in the country and exported to Britain. It can be cultivated to advantage both in Europe and America, low coarse meadows planted with it yielding an average crop of 80 to 100 bushels of berries per acre.

A 'wine' is made from the C. in Siberia, and a beverage made from it is sold in St Petersburg. *O. erecta* (*Vaccinum erythrocarpon*) is a small shrub, a native of the Virginian and Carolinian mountains, producing a fine fruit. The red whortleberry (*Vaccinium vitis idæa*) is sold in Aberdeen and other places under the name of 'cranberries.' The so-called Tasmanian C. is *Astroloma humifusum*, a shrub belonging to the natural order *Epacridaceæ*. The name is also given to *Styphelia adscendens*, a small Australian shrub of the same order, and in New South Wales to another Epacridaceous shrub, *Lissanthe sapida*, which produces red acid berries. The name is apparently derived from the idea that the berries are eaten by *cranes*.

Cran'brook, a small town in Kent, England, on the Crane, 28 miles S.W. of Canterbury, and the principal place in the Weald. It was formerly a seat of the woollen trade, introduced by the Flemings; but that has long disappeared, and the prosperity of C. now depends on the hop trade. Pop. (1871) 4331.

Crane (Old Eng. *cran*, from its *creaking* sound), a machine for raising heavy weights. In general, a chain is fixed to the object to be lifted, carried over a pulley, and brought down to and wound upon a barrel forming part of the C. Motion is given to this barrel by means of suitably proportioned toothed wheels ('spur gearing'), and the whole is set in motion either by men working handles or by a steam or other engine. Cranes vary much in shape and arrangement. In the common jib-C., the mechanism just described is attached to the lower part of a vertical C.-post, and the chain-pulley is suspended from the upper end of a long inclined post or jib, of which the lower end is connected with the framing of the C.-post, and the upper end secured by chains to the upper part of the same. In a complete travelling jib-C. the whole is placed upon a low truck running on rails, along with a small steam-engine and boiler. The jib and lifting apparatus can be turned round the post so as to lift an object situated on either side of the truck, while the upper end of the jib itself can be raised and lowered so as to suit the distance at which the object happens to be.

Crane (Old Eng. *cran*, from the sound made by the bird), the representative of a family of birds—the *Gruidæ*—belonging to the order *Grallatores*, having affinities with the *Ardeidæ* or herons, and also with the *Otidæ* or bustards. The bill is strong, with sharp edges, and the nostrils lie in hollow sinuses. The legs are long and slender, with a considerable portion of the tibiæ bare, and the toes are long, except the hind one, which is also more elevated, and distinguishes the family from the herons and bitterns. The two outer toes are connected by a small web. The cranes are all large, with long necks and powerful flight, are migratory, and fly at a great height in the air, with a steady motion. The common C. (*Grus cinerea*) breeds in Northern Europe and Asia, and migrates in the winter towards the tropics.



Common Crane.

It is of an ash-grey colour, the face and throat nearly black, and the wing-primaries black. The whooping C. (*Grus Americana*)

is pure white in the adult state, with the tips of the wings black. The demoiselles (*Anthropoides virgo*) and the crowned C. (*Balearica pavonina*), which are among the most beautiful of the family, inhabit the N. of Africa.

Crane-Fly (*Tipula*), a genus of Dipterous insects or flies, belonging to the *Nemocera*, which possess antennæ of long, thread-like character. The crane-flies form types of the family *Tipulidæ*, in which the proboscis is short, and terminated by two fleshy lips enclosing bristles. The common C.-F. (*T. oleracea*) is the typical example. Its popular name is 'Daddy longlegs.' The larvæ, living in moist ground, do great harm by attacking the roots of grasses and cereals. *Cecidomyia* (of which genus *C. destructor*, or the Hessian fly of the United States, is an example) is nearly allied to *Tipula*.

Cranesbill. See GERANIUM.

Cranganore', the most southern town on the W. coast of the district of Malabar, province of Madras, India, 80 miles S. of Calicut. The Dutch took it from the Portuguese in 1663. It was ceded to Britain by Tippoo Saib, who seized it in 1790, after it had been in the possession of the Rajah of Travancore for a year. There are native Jewish and Christian congregations here, which are said to have been founded as far back as the 4th and 5th centuries.

Cran'gon. See SHRIMP.

Cra'nia. A genus of Brachiopodous mollusca, forming the type of the family *Craniadæ*, exemplified by many extinct and by some existing species. In this family, the animal is fixed to submarine objects by the ventral or lower valve of the shell. The arms are fleshy, and coiled spirally. No hinge or articulating processes exist. The upper valve is limpet-shaped. The shell may be smooth or striped or spinous. The genus C. is first represented in a fossil state in the Silurian rocks. *C. personata* is a living species, while *C. Ignabergensis*, of the Chalk rocks, is a typical fossil form.

Cra'nial Nerves. These nerves, nine in number on each side, originate in some part of the base of the brain or upper portion of the spinal cord, and pass through apertures in the floor of the skull, to be distributed to the organs of sense and other structures in the head. They are named numerically from before backwards, but certain of them have additional names, given on account of their supposed functions. They are as follows:—1st pair. *The olfactory*, distributed to the nose, and connected with the special sense of smell. 2d pair. *The optic*, passing to the eyeballs, and connected with the special sense of sight. 3d pair. Sometimes termed *motores oculorum*, nerves of motion, distributed to all the muscles which move the eyeballs, with the exception of the external rectus and superior oblique muscles. 4th pair. Termed the *pathetici*, nerves of motion, distributed to the superior oblique muscles of the eyeball. When these muscles act, the eyeball is rotated upwards and outwards, so as to give a pathetic expression; hence the name. 5th pair. *Trifacial* or *trigeminal* nerves, both motor and sensory, conferring sensibility on the skin of the face and side of the head, mouth, lips, cheeks, and teeth; also sending a special branch, the *lingual* of the 5th, to the anterior part of the tongue (connected probably both with taste and tactile sensibility), and, lastly, supplying the muscles of mastication. 6th pair. *Abducens*, a motor nerve supplying the external rectus muscle of the eyeball. 7th pair. Divided into two portions—(1) *The facial*, or *portio dura* of the 7th, being the motor nerve of the muscles of expression; and (2) *The auditory*, or *portio mollis* of the 7th, being the nerve of the special sense of hearing, distributed to the ear. 8th pair. This consists of three nerves—(1) *The glosso-pharyngeal*, the special nerve of taste, distributed to the posterior third of the back of the tongue. (2) *The pneumogastric*, or *par vagum*, so termed on account of its wide distribution in the neck, chest, and abdomen. This important nerve supplies both motor and sensory branches to the pharynx, motor and sensory branches to the larynx, branches to the heart, which exhibit an inhibitory or restraining action over the contractions of that organ, sensory branches to the lungs, motor and sensory branches to the æsophagus, and motor and sensory branches to the stomach. (3) *The spinal accessory*, a motor nerve, distributed to the sterno-cleido, mastoid, and trapezius muscles in the neck. 9th pair. *The hypoglossal*, a motor nerve, supplying motor power to the muscles of the tongue both intrinsic and extrinsic. Each cranial nerve has an *apparent* origin from the base of the brain, and a *deep* or real origin from grey matter in the substance of the organ. The *deep* origins of the C. N. are still imperfectly known. Details regarding these may be found in *Gray's Anatomy*, p. 495, *et seq.*

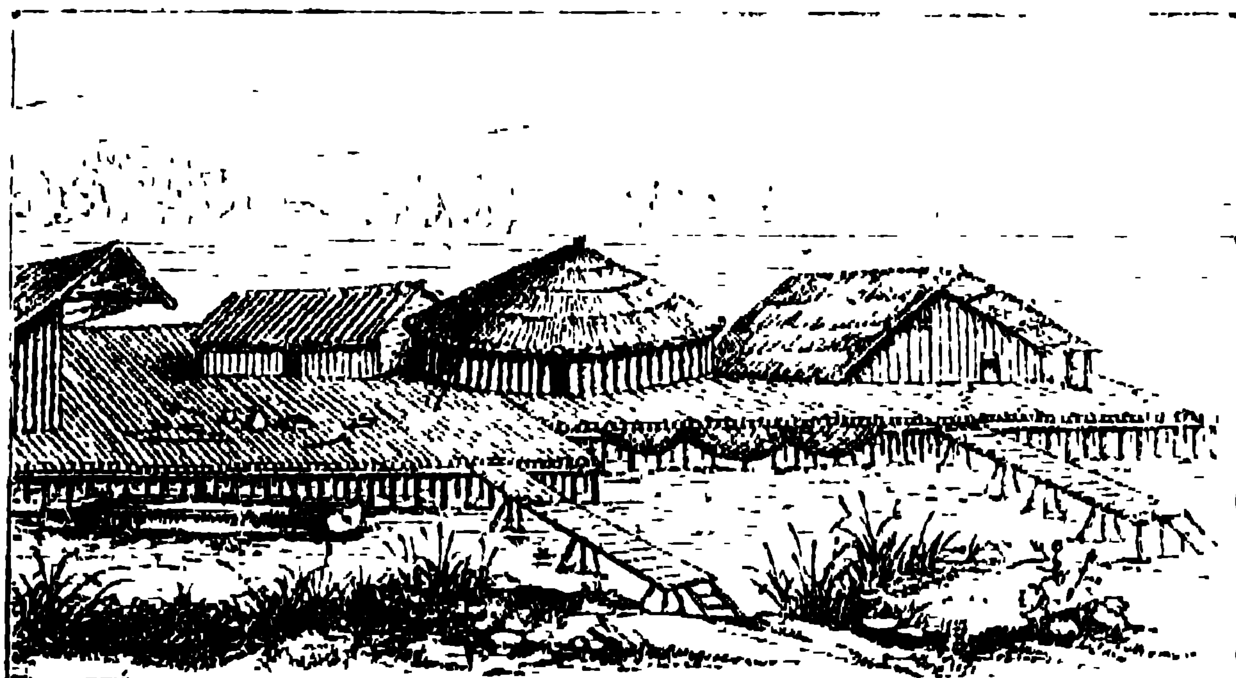
Cra'nium. Anatomists divide the skull into two portions—the C. and the face. The C. is formed of eight bones—the occipital, two parietal, frontal, two temporal, sphenoid, and ethmoid. The C. contains the brain, and the base is perforated by numerous apertures for the passage of nerves. See SKELETON.

Crank, in machinery, an arm or lever connected with a shaft, and having a rotative motion about its axis. A C. at the end of a rotating shaft is, in general, simply an arm of wrought-iron keyed upon the shaft, and having a pin called a C.-pin at its outer end. At the centre of a length of shaft the C. becomes a pair of arms (or 'throws'), joined by the C.-pin at their outer ends. In this case the C. is formed either by bending the shaft, or (more commonly) by forging a large projection upon it, and subsequently working this into the required form by suitable tools.

Cran'mer, Thomas, an English statesman and ecclesiastic, was born at Aslacton, Nottinghamshire, 2d July 1489, and educated at Cambridge, where he distinguished himself in Greek and divinity, and obtained a fellowship, which was re-granted to him after the premature death of his wife in 1513. Refusing an office at Oxford which Wolsey pressed on him, he remained at Cambridge and Waltham Abbey till 1529, when his suggestion of the invalidity of the papal dispensation in the matter of the King's marriage brought him into notice. Along with other divines, he was sent to Rome to challenge the marriage as against the Scriptures, the Councils, and the Fathers, and to collect similar opinions from the foreign universities. Clement was of course unconvinced by his arguments, but gave C. the honorary title of 'Supreme Penitentiary.' C. also attended the Emperor at Bologna on the same business, wrote a book on it, and was a leading member of the Cambridge committee which considered it. Henry made him a royal chaplain, and after the marriage of Anne Boleyn, C. (in spite of his own second marriage) was consecrated Archbishop of Canterbury on 30th March 1533, qualifying his oath of submission to Rome by an exception of his duty to God and the laws of the country. He immediately obtained from the two Houses of Convocation a declaration that the licence of Pope Julius was null as dealing with divine, not with canonical law, and that the previous marriage with Arthur had been consummated; and then, under licence from the crown, opened a court at Dunstable, which Catherine refused to attend, but in which final judgment of divorce was pronounced, 23d May 1533. C. assisted in the statutory abolition of papal authority in England, but generously tried to save More and Fisher when they declined to take the oath of supremacy and to acknowledge the Statute of Succession in 1534. The issue of a second edition of the *King's Primer* and the revision of *Tyndal's New Testament* were now set on foot by C., who also vigorously supported, against Latimer and the Vicar-General Cromwell, the first Act of Dissolution of the small monasteries (1536). He even said that cathedral chapters and all clerical corporations should be suppressed. The same year he was obliged to pronounce null the marriage of his friend Anne Boleyn, whom he had regarded as a support of Reformed religion, which in the Articles and the Bishop's Book he was gradually introducing to the Church. He was, however, in 1539, defeated by the conservative party on the 'Six Bloody Acts.' (See ARTICLES, THE SIX.) In 1540 he had formally to dissolve Henry's marriage with Anne of Cleves, and the next year to initiate the proceedings which led to the death of Catherine Howard. As before, he generously interceded for Cromwell. In spite of the intrigues of Gardiner, Norfolk, and the Catholic party, C. managed to keep the helm of ecclesiastical affairs till Henry's death, vigorously promoting Reformed doctrine even when, perhaps, as in the King's book, he did not personally accept it. His Litany was an important contribution to the Church, to which he afterwards added the First Communion Book, the Prayer-book of 1549, and lastly, the complete Liturgy. On the accession of Edward VI., C. continued by his Homilies and the circulation of Erasmus' Paraphrase, and through the Liturgy Commission, to press on reform. The Forty-two Articles were completed by him before Edward's death. He was unwillingly forced to sign the letters patent, extorted by Northumberland's conspiracy, and altering the succession, in

favour of Lady Jane Grey. Accordingly, on Mary's accession, when mass took the place of communion service, and altars and images were restored, when Gardiner became Chancellor, and a Catholic Commission was created to try Protestants for treason, heresy, and marriage, C., along with Latimer and Ridley, was thrown into the Tower. After a first trial, which was said to be irregular because the country was then unreconciled to Rome, C. was tried at Oxford in September 1555 for 'blasphemy, incontinence, and heresy.' It was not till February 1556, long after the execution of Latimer and Ridley, that the final sentence of Paul IV., anathematising C., degrading him and handing him over to the secular arm, arrived in England. Immediately after, C. received the celebrated letter from Cardinal Pole, and, exhausted by the anxieties of two and a half years' imprisonment, he issued his submission to the papal authority and his confession of Catholic dogma. In spite of this, he was publicly burnt at Oxford, 21st July 1556, surprising the Catholics by recanting his recantation at the last moment. Mr Froude strongly insists on the general purity and uprightness of C.'s character (see vol. v. of his *History of England*). There are special Lives of C. by Gilpin, Lebas, and Todd, and many documents under his hand are preserved in Strype's *Memorials* and Jenkyn's *Remains*. C. published in 1550 in Latin *A Defence of the True and Catholic Doctrine of the Sacrament of the Body and Blood of Christ.* His *Catechism* was republished at Oxford by Burton in 1829. His chief works, edited by the Rev. J. Cox, were printed at Cambridge, 2 vols. 8vo, 1844-46.

Crannoges, the name given in Ireland and Scotland to artificial islands in lakes, formerly used as habitations and strongholds by the Celtic tribes. The meaning of the term is uncertain, but it is believed to refer to the timber employed in the construction of these remarkable settlements. The *Pfahlbauten* or pile-buildings of Switzerland will be treated of under LAKE DWELLINGS, and the present article is restricted to the C. proper, or *Packwerkbauten*. The difference between the two is that the former consists of dwellings on wooden platforms placed upon piles driven into the bed of a lake, and allowing the water free course beneath, while, in the latter, the huts were placed upon islands constructed in the manner described below.



Restored Crannoges.

Although C. are mentioned in the Irish annals so early as the 9th c., they were unnoticed by archæologists until 1839. In that year drainage operations were being carried on at the Lake of Lagore, near Dunshaughlin, County Meath, and while a trench was being cut close to a mound which had formerly been an island in the lake, great quantities of bones were discovered, no less than 150 cartloads of them being taken away. Further examination showed that the mound, whose circumference was 520 feet, was formed by posts of black oak, from 6 to 8 feet in length, mortised into beams of the same wood. These lay flat upon the marl and sand below the bog, at a depth of 16 feet from the surface. The upright posts were connected by cross-beams, and portions of a second tier of posts were resting on the lower ones. The enclosed space was subdivided by oaken beams, the sides of which were in some cases grooved or rabbeted to admit panels, driven down between them. The interior of the chambers thus formed was filled up with black moory earth and with bones, chiefly of cattle, deer, and swine, though those of goats, sheep, horses, foxes, dogs, and asses were also found. There were also many weapons, ornaments, and household utensils, made of stone, bone, wood, bronze, and iron. These remains have been fully described by their discoverer, Sir W. R. Wilde, then one of the secretaries of the Royal Irish Academy.

In succeeding years many more C. were discovered in Ireland, especially in the N. and the valley of the Shannon. As a rule, they were built upon a small islet in a lake, or on a shoal not far from the surface. The settlement was either circular or oval in shape, and was marked out by a stockade of piles. Sometimes there was a double ring of these. They were from 4 to 9 inches in diameter, and for the most part were young oak-trees, though alder-trees were also employed. They projected above the water several feet, and probably were interlaced with branches, so as to form a breastwork. The bottom of the enclosure was covered with round logs from 4 to 6 feet long, and on the top of them was piled a mass of clay, gravel, and boulders, to a height of about a foot above the surface of the water. On the island thus formed a platform was placed, covering the whole, or a portion of its area. Flat stones, which had apparently been used as hearths, were found in nearly all cases near the centre of the platform, together with at least one pair of querns. Occasionally the C. was connected with the mainland by a causeway or a bridge of planks, but more frequently it could only be reached in a boat or canoe.

From the middle of the 9th to the beginning of the 17th c. C. are mentioned in the Irish annals. They were originally intended for defence, and speedily became the strongholds of robber chiefs, who carried off to them the spoils gathered in their raids, and, favoured by the situation of their fortresses, were frequently enabled to offer a successful resistance when efforts were made to root them out.

In 1857 the existence of C. in Scotland, at Banchory, in Loch Cannor, and other places, was first brought under the notice of archæologists by Mr Joseph Robertson. In 1863 a group of similar structures was discovered in the Loch of Dowalton, in Wigtownshire, and was described by Lord Lovaine (now Earl Percy). Since then many other C. have been discovered in various parts of Scotland. Their construction is exactly similar to that of the Irish C., and a like similarity exists with respect to the antiquarian remains found in them. The Scotch C. are frequently mentioned in history down to the end of the 18th c. Several of them were fortresses of considerable importance. That of Lochindorb, in Moray, for instance, was regarded of so much importance by Edward III., that in 1336 he marched with an army to its relief; while that of Loch Cannor, or Kinord, in Aberdeenshire, was in 1648 dismantled by order of the Estates of Parliament. In September 1875 two large canoes, in an excellent state of preservation, were drawn out of the bed of this loch.

C. have also been discovered in some of the smaller lakes of Switzerland, but in the larger lakes their place was taken by the pile-buildings, whose construction was better adapted to withstand the waves of extensive sheets of water. Remains of C. also exist in the northern island of New Zealand, and Lieutenant Cameron reports (1876) the existence of similar structures in the interior of Africa.

See Wilde's *Catalogue of the Museum of the Royal Irish Academy; Proceedings of the Royal Irish Academy*, vols. i. v. and vii.; *Proceedings of the Society of Antiquaries of Scotland*, vol. iii.; Keller's *Lake Dwellings of Switzerland and other Parts of Europe*, translated and arranged by J. E. Lee (2d ed. Lond. 1878); and Lubbock's *Prehistoric Times* (3d ed. Lond. 1872).

Crape (Fr. *crêpe*), a gauze-like fabric made of raw silk, woven without crossing, stiffened with gum, and twisted at the mill, which gives the crispy appearance when taken from the loom. It is usually dyed black, and is much used in mourning.

Cra'shaw, Richard, 'the idol of Cowley,' a minor poet, was born in London about 1616, and educated at Charter House and at Cambridge, where he took his degree in 1638. He was for a time a popular preacher in the English Church, but becoming a Roman Catholic, he went to Paris, and thence to Italy, where he became canon of the Church of Loretto. He died about 1650. C.'s poems are devout and earnest, but inferior to those of Herbert, whom he imitated. His chief works are *Steps to the Temple, The Delights of the Muses*, and *Carmen Deo Nostro*. Pope borrows frequently from C., especially in *Eloisa*. See Turnbull's edition (J. R. Smith, Lond. 1858).

Crassatell'a, a genus of molluscs, the shells of which are thick, solid, and bulging, attenuated behind, and with a surface concentrically furrowed. An internal ligament exists. C. is well represented by living species, and in a fossil state begins in the Cretaceous rocks. *C. ponderosa* (Tertiary Eocene) is a familiar species. The genus belongs to the family *Cyprinidæ*, of the class Lamellibranchiata.

Crassula'ceæ, the Houseleek or Stonecrop order, a natural order of Dicotyledonous succulent herbs or shrubs. There are in all about forty-six species described, included under twenty-four genera, found in dry situations in all parts of the world, but chiefly at the Cape of Good Hope. Astringent, refrigerant, and acid properties are characteristic of the whole order, none of which are of much importance. *Cotyledon umbilicus* (q. v.) was at one time a popular remedy in hysterics, and an external application is used to destroy warts and corns. Of late it has been introduced as a remedy for epilepsy, against which the *C. orbiculata* of the Cape of Good Hope is said to be efficacious. The stonecrop (*Sedum acre*) possesses, according to popular belief, emetic and purgative properties. It is very acrid, and hence called 'wall pepper.' *S. Telephium* is astringent, and in Ireland *S. dasyphyllum* rubbed among oats is reputed a certain cure for worms in horses (Bentley, Lindley). *Sempervivum tectorum* (the houseleek) is used as an external application to wounds; *Bryophyllum calycinum* (q. v.) produces buds on the edges of its leaves.

Crass'us, Lu'cius Licin'ius, one of the greatest orators that Rome ever produced, was born B.C. 140. From a very early age onwards he displayed pre-eminent oratorical ability in judicial proceedings, in senatorial orations, and in popular addresses. With Q. Scævola he became consul B.C. 95, and during their term of office was passed the *Lex Licinia Mucia de Civibus regundis*, compelling all who were not citizens to leave Rome, a law which aided in provoking the Social War. C. was fond of luxurious living, and, in allusion to his fine house and effeminate manners, he was called by Brutus 'the Palatine Venus.' He died, B.C. 91, from a fever brought on by a violent contention in the senate with Philippus, the consul. C. is introduced by Cicero as one of the chief interlocutors in the *De Oratore*. —**Mar'cus Licinius Di'ves C.**, the triumvir, was born about B.C. 105. He escaped to Spain in dread of the enmity of Marius, for resistance to whom his father and brother had lost their lives. After various adventures C. joined Sulla, B.C. 83. At a battle in Lucania, 71 B.C., C. defeated with great slaughter Spartacus, the rebel hero of the Servile War. In B.C. 70 C. and his envied rival Pompey were elected consuls. To gain public favour during his consulship, C. gave the populace a banquet of 10,000 tables, and distributed corn sufficient to supply the family of every citizen for three months. About B.C. 60, what is known as the first *triumvirate* was formed by Cæsar, Pompey, and C., his position in which C. owed to his enormous wealth, amassed by rapacious avarice, and to a reputation among the well-to-do citizens for practical talent, which his acquisition of this wealth had obtained for him. According to the compact of the *triumvirs*, Pompey and C. were re-elected consuls, B.C. 55, and on the distribution of consular provinces, C. chose Syria. From a vain ambition for military fame, he wantonly made war on the Parthians, but his insatiable cupidity proved his ruin, by leading him to neglect his military duties for the plunder of temples. He was betrayed first by Ariamnes, and afterwards by Andromachus, and after suffering defeat at Carrhæ, fell by an unknown hand in a treacherous interview with Surenas, the Parthian general, B.C. 53. In the Parthian expedition C. is said to have lost 20,000 men killed and 10,000 taken prisoners. Orodes, the Parthian king, caused melted gold to be poured into the mouth of the lifeless C., saying, 'Sate thyself now with the metal of which thou wert so greedy in life.'

Cratæ'gus (the hawthorn), a genus of Dicotyledonous plants belonging to the natural order *Rosaceæ* (sub-order *Pomeæ*), natives of Europe, N. America, and temperate Asia and Africa. The best-known species is *C. Oxyacantha*, the common Hawthorn (q. v.), so familiar a material of our hedgerows, found in nearly every part of Europe, and in N. Africa and Western Asia. It is sometimes called the 'May-tree,' from blossoming in May, a month also in which most of the other species of C. also appear in bloom. With the exception of the species named, none are natives of Britain. The cockspur thorn (*C. Crus-galli*) is a native of N. America. The Azorole (*C. Azarolus*) and the Aronia (*C. Aronia*), the 'haws' of which are sometimes used for dessert or tarts, are natives of the S. of Europe and the Levant. Among the other cultivated species may be mentioned *C. orientalis*, *C. tanacetifolia*, *C. Mexicana*, and *C. pyracantha*, the latter being a native of the Caucasus and the S. of Europe, and known to gardeners, who value it as a wall-tree, as the *Pyracantha*.

Cratæ'va, a genus of tropical shrubs or trees of the Cape order (*Capparidaceæ*). *C. Nurvala*, of the Malabar and Society Islands, is planted in burial-grounds as a sacred tree. Its leaves and other parts of the tree are aromatic, bitter, and stomachic. The bark of the root of the garlic pear (*C. gynandra*), so called on account of its strong smell of garlic, blisters the skin like Spanish flies.

Cra'ter (Gr. *krater*, 'a bowl'), the funnel-shaped cavity on the summit of a Volcano (q. v.), through which the volcanic products are mostly ejected. The largest C. on our earth is that of Kilauea, in the island of Hawaii, forming a large lake of molten lava about 2 miles in circumference. On the surface of the moon numerous large cavities are observed, which, from their position and general appearance, are probably the craters of extinct volcanoes. Of these, the most interesting are the craters of Copernicus and Tycho, 55 and 50 miles in diameter respectively.

Crati'nus, a representative poet of the old Athenian comedy, was born at Athens, B.C. 519. He wrote twenty-one comedies, none of which are extant, and he gained nine victories, one of them over the *Clouds* of Aristophanes. He made changes in the outward form of comedy, as, for example, by fixing the number of actors at three. He was the first to introduce into comedy reproachful attacks on public men and unsparing satire of vice. C.'s imagination was fervid, and his style impetuous and somewhat grandiloquent. In the *Knights*, Aristophanes (as translated by Mitchell) says of him—

> 'His step was as the tread of a flood that leaves its bed,
> And his march it was rude devastation.'

C. died B.C. 422.—**C. the Younger**, an Athenian poet of the middle comedy, flourished during the middle of the 4th c. B.C.

Cratipp'us was an eminent peripatetic philosopher of Mytilene, and an instructor of Marcellus and Cicero. For many years he lectured on philosophy in Athens, where Cicero the Younger, and subsequently Brutus, were among his auditors. Cicero entertained a very high opinion of him, and procured for him from Cæsar the Roman franchise. After the battle of Pharsalia, C. accompanied Pompey, and soothed the spirit of the defeated triumvir with the consolations of philosophy. He does not seem to have written any philosophical works.

Cratox'ylon, a genus of bushes or small trees of the St John's wort order (*Hypericaceæ*), natives of China, the Malaya Peninsula, Java, and neighbouring islands. About ten species are described, but only one—*C. Hornschuchii* of Java, which is slightly astringent and diuretic—is known to have medicinal properties.

Cray'er, Gaspar de, a Flemish historical painter, born at Antwerp, 1582, died at Ghent, 27th January 1669. He won the admiration of Rubens and the friendship of Van Dyck, whom he rivalled in portraiture. His pictures, lofty in style and subject and large in size, are correct and vigorous in design, and full of dignity though somewhat cold. About forty of them are in the churches and the Museum of Ghent. His *Virgin and Infant Jesus Enthroned*, now at Düsseldorf, was purchased by the Elector Palatine for 80,000 fls.

Cray'fish (*Astacus fluviatilis*), a species of Decapodous crustaceæ belonging to the division *Macrura*, including the lobsters, shrimps, &c., is found in British rivers. The family *Astacidæ*, to which the C. belongs, has the anterior pair of feet very large, the appendage at the base of the outer antennæ very small, and the middle segment of the tail-fin divided transversely by a suture. C. is chiefly nocturnal in habits, and, like the lobster, turns red on being boiled.

Cray'on, a French word meaning a pencil (from the Lat. *creta*, 'chalk'), is applied especially to a small cylinder employed in drawing on paper. It is usually made of fine pipeclay, coloured with metallic pigments and carmine. Delicate softness rather than vigour generally characterises drawings in C.

Cream (lit. 'froth,' Fr. *crême*), the rich, fatty part of Milk (q. v.), which forms a yellowish-white layer on the surface of milk when suffered to remain at rest. Butter is made from it by churning.

Cream of Tartar is the acid or bitartrate of potash, the composition of which is represented by the formula $C_4H_5KO_6$. It is obtained from Argol (q. v.), or crude tartar—the very impure bitartrate of potash which is deposited from the juice of the grape during fermentation. The argol is dissolved in boiling water; the solution thus obtained is digested with animal charcoal to remove the colouring matter, and then allowed to cool, when C. of T. separates in white crystals. C. of T. is comparatively insoluble in cold water, but is tolerably soluble in boiling water. It is used in medicine as a diuretic and purgative.

Cre'atine (Gr. *kreas*, 'flesh') is a crystalline substance contained in muscular fibre, hence is found in the extract of meat. It also occurs in blood and urine, and in the substance of the brain. In order to extract the C. from meat, the latter is mashed and digested for some time with cold water; the clear, aqueous extract thus obtained is boiled to coagulate albumen, filtered, mixed with baryta water, again filtered and evaporated to a syrup, when C. crystallises out after some time.

C. has the composition represented by the formula $C_4H_9N_3O_2$. It has been prepared synthetically. Although neutral to test-paper, it forms crystalline salts with several acids.

Creat'inine is a crystalline substance occurring in small quantities in the urine of man and of many animals. It may be obtained from *creatine* by boiling it with dilute mineral acids. C. differs from creatine in containing the elements of a molecule of water less than that body, its composition being expressed by the formula $C_4H_7N_3O$. Unlike creatine, it is a powerful base: it unites with acids to form crystalline salts, and also forms compounds with certain salts.

Cré'billon, Prosper Jolyot de, a French dramatist, born at Dijon, 13th January 1674, of middle-class parents, was intended for the law, which, however, he very soon left for a literary career at Paris. After a failure, he was encouraged by his master and friend, Prieur, to produce his first successful tragedy, *Idoménée*, which was played in the winter of 1705-6. In 1707 his taste for the gloomy and horrible was shown in *Atrée et Thyeste*, which was performed eighteen times. Considerable skill in dramatic situation and in striking, though often inflated, description mark this play. In the same year C. married Charlotte Peaget, whom he had previously seduced, and the death of his father in embarrassed circumstances compelled him to devote all his time to the drama. The tragedy of *Electre* (1709), founded on the play of *Sophocles*, has been bitterly criticised by Voltaire in his *Éloge de C.* (vol. lxi. of collected works), because it makes the inspired servant of destiny the subject of an insipid affection for Itys. In 1711 appeared his best tragedy, *Rhadamiste*, founded on the old romance *Bérénice*. The character of *Zénobie* is admitted, in spite of the sarcasm of Boileau, to be very powerfully drawn; the play is also peculiar from the hatred of the Roman Empire which it shows. The remaining plays of *Xerxes*, *Semiramis*, *Pyrrhus*, *Catilina*, *Le Triumvirat*, following at considerable intervals, have no lasting merit. *Catilina*, completed on the suggestion of Madame de Pompadour, and produced at the King's expense in 1748, had a brilliant success for one season. In spite of his extravagant social indulgence, followed after his bankruptcy by the most morose eccentricity, C. was elected a member of the Academy, afterwards royal censor, and finally one of the royal librarians. He died 17th June 1762. He is still ranked among the classical tragedians of France, and has been called the French Æschylus, but he is quite singular in his want of literary education and taste. His genius resembles that of Marlowe. Besides the splendid edition of C.'s works, published by order of Louis XV. (2 vols. Par. 1750), there are editions by Didot the Elder (3 vols. Par. 1812; 2 vols. 1818), and by Perelle (2 vols. Par. 1828). He left a son, **Claude Prosper Jolyot de C.**, born at Paris, 14th February 1707, and educated at the Jesuit College 'Louis le Grand.' C. began his literary life by writing opera-bouffe for the theatres, then formed a connection with the 'Académie de ces Messieurs,' a half-literary, half-social club of aristocrats, to whom his talent for epigrammatic versification was useful, but soon sank to the manufacture of licentious novels, with which his name is chiefly associated. In 1734 appeared *Tanzai*; in 1736 *Les Égarments du Cœur et de l'Esprit*. In 1740 he married an Englishwoman, Lady Stafford. His worst book, *Le Sopha*, was declared to be indecent by Madame de Pompadour, and C. was banished from Paris for five years. On his return, however, in 1755, he was appointed censor. C. died April 12, 1777. There was a certain independence in his writings which made the social and political allusions very effective. His *Œuvres Complètes* appeared at Paris (7 vols. 1779).

Cre'cy, or **Cress'y**, a small French town in the department of the Somme, 12 miles N.N.E of Abbeville. Pop. (1872) 1359. It is celebrated in history as the scene of the inglorious defeat suffered by Philippe VI. of France, August 26, 1346, at the hand of Edward III. of England. Froissart numbers the English force at 16,000, which is probably under-estimated, and the French at 68,000. The flower of the French chivalry was destroyed, Philippe escaping with only four of his barons.

Cre'dence (Ital. *credenza*), is a table near the altar in churches, called also the *prothesis*, *oblationarium*, and *ministerium*, on which the bread and wine to be used in the eucharist are placed previously to consecration. It takes the form of a little table, sometimes of stone, of an aumbrey in the wall, or, as with the Cistercians, of a bracket or recess; and is sometimes on the N. side of the altar, sometimes on the S. When there is one on both sides, as is sometimes the case, the one on the epistle-side has a drain and a shelf to hold the basin and the cruets; the one on the gospel-side holds the books, candles, and ornaments of the altar. The first use of the C. in the Roman ritual occurs in the time of Leo. X., in 1516, when the custom of personal offering fell into disuse. The name is derived from the ceremony of tasting the elements in the pontifical mass (Ital. *credenzare*, 'to taste before presenting to another'). When the Pope celebrates on Easter Day there are three credences. Of the two on the epistle-side, one holds the deacon's plate; the other, two candles and the necessaries required by the sacristan. On the third, which is on the gospel-side, the sacristan washes the sacred vessels at the end of the creed; he also drinks of the wine and water; and finally, at the offertory, tastes of the particles from which the hosts are prepared, as a precaution against poison.

Creden'tials are letters given to an ambassador or other official sent by one Government to another, to entitle him to its confidence.

Cred'it. The meanings of this word are in political economy various yet closely related, and having nearly the same import as they have in ordinary and commercial language. To many it probably seems very puzzling to be told of the enormous value of C. in commercial affairs, and at the same time to be told of the superiority which the *no-C.* or ready money system of dealing has over the C. It is plain that, to supply the requirements of domestic life, scarcely any one should require, or can ultimately be the better of receiving, C. By a C. system of retail dealing, the prudent and honest man is taxed on account of the imprudent and dishonest, and even the most prudent man is liable to be misled by the impossibility of knowing at what expense he is living until his half-yearly or yearly bills come in. In retail dealing, therefore, the ready-money system has every advantage on its side; the opposite being a pandering to that weakness of man's, still more of woman's, which leads them to prefer incurring debt to making an immediate payment. In the extensive dealings of commercial men with one another, however, the case is very different. Suppose a retail dealer, seeing his way to selling £100 prime cost of goods during the next three months for £130, but not possessing £100 with which to make the purchase. Then, on the question of whether or not he can induce the wholesale merchant to intrust him with the goods with three months' C. depends his profit of £30, and also the wholesale dealer's profit. The principle here involved is of universal application; but that C. may work to the advantage of the community, it must rest on a solid basis of capital. No doubt, if a man who has no capital can persuade the world that he has an ample one, he will—so long as the world is so persuaded—get C.; but then without capital the delusion cannot last, and bankruptcy is the result of the imposture. In commercial ventures, the capital at command and the nature and extent of the business must be prudently regarded in taking C. The giving of C. is often the most difficult and important question which a commercial man has to consider.

Credit, Cash. See BANK, BANKING, and BOND.

Credit, Letter of.—The letter is so called by which the writer requests the person or firm which he addresses to pay money to the bearer or some other party mentioned in the letter. Business may be transacted by means of a L. of C. between any two persons or firms, but usually it only passes between bankers resident in different places. It enables a person paying in money to a bank at one place to draw it at another, and so to avoid the risk and trouble of carrying it. For the convenience so afforded, the bank issuing the letter charges a percentage on the value of the C., the rate of the percentage varying according to the rate of exchange between the places. A L. of C. is a great convenience to any one going to a foreign place. It is not necessary to draw the full value at once. You present your letter, say for £100, to the banker to whom it is addressed, and request him to give you the foreign equivalent of £20. This is endorsed on the letter, and there remains £80 at your C. Even in a place where the granter of the letter has no correspondent, little or no difficulty is usually found in drawing upon it. But anyone intending to go from place to place abroad will find the best form of carrying pecuniary C. to be Circular Notes (q. v.). See also EXCHANGE.

Credit Foncier is the French term for a loan on the security of land. Three companies have been established by the French Government with certain privileges having the title of C. F. The loans are repayable so that principal and interest are extinguished at the same time. The same system of repayment of loan has been adopted by various building and property investment companies in this country. See BUILDING COMPANY.

Credit Mobilier. See MOBILIER, CREDIT.

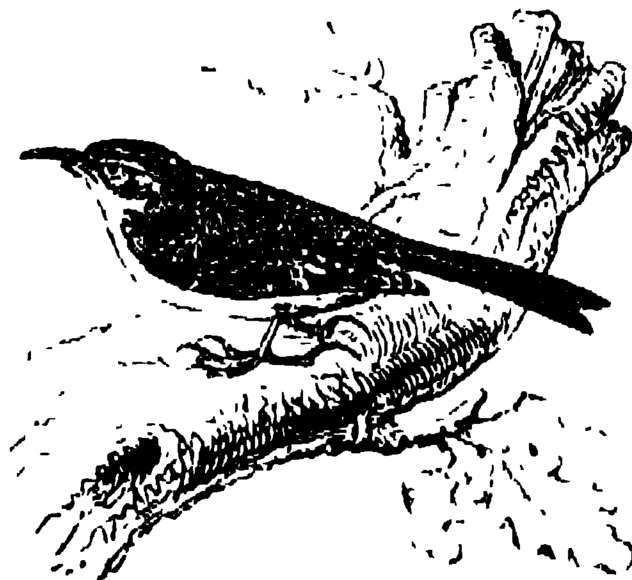
Cred'iton, or **Kirton** (Old Eng. *Cridian-tun*, 'the town on the Creedy'), a town of Devonshire, 8 miles N.W. of Exeter, and a station on the N. Devon Railway. The Church of the Holy Cross is a fine structure. Shoemaking forms its chief industry, though formerly it had manufactures of woollens and serges. Cider is also made. Pop. (1871) 4222. C. is the birthplace of St Boniface (q. v.).

Cred'itor. See DEBTOR, BANKRUPTCY.

Cre'do (Lat. 'I believe') is a part of the service of the mass, so called from the first word.

Creeds are formal statements of the doctrines believed by the Church, concisely expressed for the purpose of being conveniently recited. 1. The Latin *credo* ('I believe,' whence the English *creed*) was not the only name given to such a production. The most usual name was Lat. *symbolum*, Gr. *symbolon*, which was a token by which the initiated were admitted into the mysteries of the heathen gods; and when we know how much the early Christians borrowed from the heathen (see Middleton's *Letter from Rome*), and remember that the holy mysteries of the Church were also concealed from the uninitiated, we need be at no loss to account for the name, considering the use made of the C. Another usual name was Lat. *regula*, Gr. *kanōn*, 'the rule,' so called because it was the authorised standard or rule of faith. Other names were Gr. *mathēma*, 'the lesson,' *graphē* and *gramma*, 'letters or learning,' so called from the Catechumens (q. v.) having to learn it. 2. The first use of the creed was (1) in the preparation of catechumens for baptism. They had to repeat it privately to the catechist, then publicly in the church, and, lastly, to make a more solemn profession of it at the time of baptism, and to answer questions put by the minister relative to the several articles of it. From this it came naturally to be used (2) as a test of church-membership; then (3) as a test of orthodoxy, and (4) in a liturgical character. 3. The earliest creed made use of for the purpose was a very short and simple one, namely, 'I believe that Jesus Christ is the Son of God' (Acts viii. 37); but article after article was added to this as the doctrine of the Church was gradually developed. The idea that what is called the Apostles' Creed was composed, as some say, by the apostles at a council held before leaving Jerusalem, some going so far even as to assign a particular article to each apostle, is simply absurd, as no one who knows anything about the development of Christian doctrine needs to be told; for several of the articles in it were not in any Greek or Latin creed for the first three or four centuries. It was most probably compiled from various C. used by the primitive Church, several of which are preserved in the writings of the early fathers. There are fragments in the writings of Irenæus, Origen, Tertullian, Cyprian, Gregory Thaumaturgus, and Lucian the Martyr, and in the Apostolic Constitutions, and more perfect forms under the names of the C. of Jerusalem, of Cæsarea, of Alexandria, and of Antioch, in none of which are the articles of the Communion of Saints and Descent into Hell mentioned; nor were they originally in the Apostles' or Roman Creed. The article of the Descent into Hell was almost peculiar to the creed of Aquileia, and was only introduced into the Apostles' Creed about 600. The Nicene Creed (q. v.) was drawn up at the Council of Nicæa (325), with special reference to the Arian heresy (see ARIUS) that the Son was not equal in all respects to the Father. But the creed, as we have it, is that of the council as it was afterwards enlarged by the Council of Constantinople (381), and with the word *filioque* ('and from the Son,' in reference to the Procession of the Holy Spirit—q. v.), which was afterwards added by the Latin Church, and caused the inveterate schism between the Eastern and Western Churches which has continued till the present day. The so-called Athanasian Creed (q. v.), attempted to be fathered on the great opponent of Arius, is unquestionably a forgery of a much later time. These three are the C. proper of the Catholic Church, and all that existed till the Reformation. After the doctrine of the Church of Rome had been defined by the Council of Trent (q. v.), an embodiment of it was published under the name of the Creed of Pope Pius IV. Confessions of Faith (q. v.) are simply more elaborate C. See *Le Symbole des Apôtres*, by Michel Nicholas (1867); Pearson *On the Creed;* Waterland's *Critical History of the Athanasian Creed;* Dorner's *Entwickelungsgeschichte der Lehre von der Person Christi* (Stuttg. 1839); and Donaldson's *Critical History of Christian Literature and Doctrine* (Edinb. 1864).

Cree'per (*Certhia*), the type of a family (*Certhidæ*) of the Insessorial sub-order *Dentirostres*. In these birds the toes are very long and slender, the outer toe being longer than the inner one, and united to the middle toe beyond the first joint, and to the inner toe up to the latter joint. The hind-toe is long and slender, and the claws are long and curved. The bill is also curved and slender. The hinder toe is very mobile, and all the toes may be twisted so as to make the claws available for holding on to the bark of trees. The creepers occur in both Old and New Worlds.



Creeper.

The British species is the brown C. (*C. familiaris*), averaging about 5½ inches in length. It also occurs in Europe and N. America. The wall-C. (*Tichodroma muraria*) of S. Europe is another species. The food consists of insects, and the tail-feathers assist in climbing the trees.

Creek (Old Eng. *crecca*, Dutch, *kreek*, 'a bend or corner') is a small inlet on a low coast. In America the word is synonymous with *brook*.

Cre'ma, a walled town in the province of Cremona, N. Italy, on the Serio, 23 miles N.W. of Cremona. It dates from the 6th c., has an old castle and cathedral, and some silk and lace manufactures. Pop. about 9000.

Cremas'ter is a slender muscle found in the human being, investing part of the testicle and spermatic cord. It derives importance in surgery from forming one of the coverings of an oblique inguinal hernia, where a portion of bowel passes obliquely through the ring or opening through which in early life the testicle passes from the abdominal cavity into the scrotum.

Crema'tion. See BURIAL OF THE DEAD.

Cremo'na (anciently *Cremonensis-ager*, a Gallic tribal name), the capital of a province of the same name in Lombardy, N. Italy, on the Po, 46 miles S.E. of Milan. It has some fine buildings, notably a splendid cathedral, which has a clock-tower (built from 754 to 1284) 357 feet high, and a great baptistery with a marble vase of the year 900. C. received a Roman colony 219 B.C.; soon after it became a place of great trade, and

had the largest amphitheatre in Upper Italy. Destroyed by Vespasian, it did not regain importance till the middle ages, and in modern times it has again declined. It has manufactures of silk, cotton, and earthenware, and was formerly famous for its violins and violin-strings. Hence the name C. became a general name for violins made at C. Pop. (1871) 28,679.

Crenel', or **Crenelle'** (Fr. *créneler*, 'to indent;' from the Lat. *crena*, 'a notch'), in the fortification of the middle ages, an embrasure in the battlements of a castle or other building, to shelter a man with a bow and arrows, or some other weapon of offence. Buildings so provided are said to be *crenellated*.

Crenelle, or *Crenellated*, in heraldry, a term used to describe a charge embattled, or drawn like the battlements of a wall.

Cren'ic Acid is a substance occurring in certain mineral springs, and was discovered by Berzelius. Crenate of ammonia is a frequent ingredient of vegetable mould. C. A. is a pale-yellow amorphous substance, said to have the composition expressed by the formula $C_{12}H_{12}O_8$.

Cre'ole (Span. *criollo*, from *criar*, Lat. *creare*, 'to create'), a word used in S. America, Mexico, or the W. Indies, to denote one born in any of those countries, but who is of European extraction. It is sometimes loosely applied to a mulatto or mestizo, *i.e.*, to one of mixed blood; but this is not its proper use.

Cre'osote, or **Kre'osote** (Gr. *kreas*, 'flesh,' and *sôter*, 'a preserver'), is a substance much used as an antiseptic and preservative. It is obtained by a series of operations from wood-tar, similar to those by which Carbolic Acid (q. v.) is separated from coal-tar. Considerable doubt exists as to the true composition of C., and indeed it is not certain whether it is a distinct substance or a mixture. Much of the C. employed in commerce is simply impure carbolic acid. The smoke of burning wood owes its preservative qualities to the presence of C.

Creosote Plant. See LARREA.

Crescen'do (Ital. 'growing'), a mark of expression used in music to indicate a gradual increase of loudness unaccompanied by any alteration in speed.

Cres'cent (Lat. *crescens*, 'to increase'), a representation of the moon in her first quarter, or as defined with a concave and a convex edge. The *C. montant*, that is, with the horns upwards, which is the symbol of the Turkish Empire, was originally the arms of the Byzantine Empire, and the Turks, when they overthrew that empire, adopted it as their chief bearing.

Crescent, in heraldry, is the symbol described above, and is represented as *montant*, *increscent*, or *decrescent*, as the horns are respectively towards the chief, the dexter side, or the sinister. It is used both as a bearing or charge, and as a mark of cadency or difference.

Crescent, Orders of the. There have been three O. of the C. The first was instituted by Carlo I., King of Naples and Sicily, in 1268; the second, by René Duc d'Anjou in 1448, the badge of the latter being a gold C., with the words *Los en croissant* ('Praise by increase') enamelled on it; the third, which is still in existence, was established by the Sultan Selim III. in 1801, two years after the battle of Aboukir. He had sent a C. of gold, richly mounted with diamonds, to Lord Nelson, which the English admiral wore, calling himself occasionally the Knight of the C. This induced the Sultan to found the order. It can only be conferred on Christians, since Mohammedans are forbidden by the Koran to wear such decorations.

Crescent City, a town in the central part of California, in Tuolumne county, on the banks of the Tuolumne river, a branch of the San Joaquin, and navigable for steamboats 10 miles above the town. C. C. is also the name of another small town in California, which is situated on the Pacific, and has a pop. of 458. It is also the popular name of New Orleans.

Crescentia'ceæ, the Calabash order, a natural order of Corolifloral Dicotyledonous plants, closely allied to the *Bignoniaceæ*, natives of tropical and sub-tropical regions, abounding in Madagascar, the Mauritius, the Seychelles, and other islands of Eastern Africa, between 30° S. and 30° N. The order is also represented in America and Asia, but is unknown in Europe and Australia. Altogether thirty-four species and eleven genera are described. *Crescentiâ*, *Parmentiera*, *Colea*, *Kigelia*, &c., are examples. The properties and uses of the order are unimportant. The fruit of *Parmentiera edulis* (Quauhxilotl) is eaten by the Mexicans, and that of *P. cerifera* (which yields wax, and from the fruit being shaped like a candle is called the 'candle-tree') by cattle in the Isthmus of Panama. The fruits of *Tanaecium lilacinum* and of *Colea Telfairiæ* are also eaten. The wood of *Kigelia pinnata* is used for canoes, &c. See CALABASH-TREE.

Cress, a name given to many plants, the pungent, mustard-like taste of which makes them valued as salads. The name is sometimes limited to the genus *Lepidium* (natural order *Cruciferæ*). *L. sativum*, the garden-C. or town-C., is a native of Persia, but has been cultivated in this country since 1548. It is much used for giving a warm flavour to salads. It is easily raised, and, like the rest of the order, powerfully antiscorbutic. *L. latifolium* (pepper-wort, dittander, or poor man's pepper), is even more pungent, and is also used as a condiment. *L. virginicum* is used in N. America and the W. Indies, not only as a salad, but as a diaphoretic. *L. oleraceum* of New Zealand (the *Eketera* of the Maories) is eagerly sought by the crews of ships as an antiscorbutic. *L. Piscidium*, a Sandwich Island species, has the property of intoxicating fishes, so that they float in helpless condition near the surface of the water, and are then easily captured. It is also pungent and antiscorbutic. The latter properties are also possessed by the genus *Barbarea*, winter-C., or herb St Barbara, species of which are common in Britain and other parts of Europe and N. America, as well as the genera *Nasturtium* (water-C., *N. officinale*) and *Cochlearia* (Scurvy-Grass, q. v.). Mouse-ear C. is *Arabis Thaliana*; Para C., *Spilanthes oleracea*; penny C., *Thlaspi arvense*; Peter's C., an old name for *Crithmum maritimum* (samphire); swine's-C. and wart-C., *Senebiera Coronopus*. See *Tropæolum* (Indian C.); St Barbara's C., *Barbarea vulgaris*; Sciatic C., *Iberis amara*.

Cress'et (Fr. *croisette*, dim. of *croix*, 'a cross'), an open lamp, filled with combustible material, and placed on a watch-tower, beacon, or lighthouse, or carried on a pole. It is so called because beacons had formerly crosses on their tops.

Crest (Lat. *crista*, 'a tuft,' perhaps connected with *crescere*, 'to grow'), the ornament which was placed highest on a helmet. Herodotus says the Carians were the first who wore tufts and feathers in this manner. In classical mythology the shield of Minerva bore an owl, that of Mars a lion or tiger, and that of Jupiter Ammon a ram's head. Diodorus Siculus asserts that the Kings of Egypt bore the head of a lion, a bull, or a dragon. Homer describes the C. as made of horse-hair, in which he is followed by Virgil. Æschylus, in the *Seven against Thebes*, speaks of three crests on one helmet; and Suidas is of opinion that Geryon passed for having three heads because he wore a triple C. Alexander the Great bore a ram's head to support his pretence of descent from Jupiter Ammon, Julius Cæsar a star to indicate his relationship to Venus, and Pyrrhus a plume between the horns of a goat. In the Roman army the C. served to distinguish the various centurions. In the middle ages knights bore a plume of feathers, generally those of the ostrich, the peacock, or the heron. Richard I. (*Cœur de Lion*) rendered the lion renowned during his crusade. About the time of Henry III. the C. began to be used generally as a mark of distinction; hence it came to be called a *cognizance*. It was at first made of light material, frequently of boiled leather, but by and by wood and metal were employed, and the C. became smaller.

In mediæval heraldry the C. is a figure or device used as an adjunct to the shield, and represented as standing on a coronet, a wreath, or a cap of maintenance. Though sometimes identical with, it is generally distinct from, the principal charge on the shield. The dragon and the wyvern are among the earliest figures borne in this country. The lion crowned, now the C. of the royal family, was first assumed by King Edward III., who also bore an eagle or raven. The Panache (q. v.) alone, and with the heads of various animals, appeared early. Fantastic emblems soon began to be used as crests. That of the Duke of Hamilton is said to commemorate the escape of Sir Gilbert Hamilton, in 1323, in the disguise of a woodcutter. The C. of the Earls of Warwick of the Beauchamp family—the last of whom died in 1445—is a bear, muzzled and collared, with a ragged staff in its forepaws. In the 14th c. the coronet, the

wreath, and the cap began to be emblazoned under the C.; but the C.-coronet must be distinguished from one indicating princely or royal rank. The earliest wreath known to heraldists is engraved on the memorial brass to Sir Hugh Hastings at Elsyng, Norfolk, and dated 1347. The wreath which is now generally used consists of two stripes of ribbon twisted into a cord, and tinctured with the principal metal and colour of the arms—the first coil being metal and the second colour. Heraldists regard the significance of a bearing on the shield as complete without the C.; and it has even been asserted that the latter is a personal bearing only, and not hereditary. Early and general usage, however, pronounce the C. to be hereditary, like the coat-of-arms, the inventions of seal-engravers and coach-painters being disregarded. See Fairbairn's *Crests of the Families of Great Britain and Ireland* (T. C. Jack, Edinb. 2 vols. 1860).

Creste, or **Crest**, in architecture, an ornamental finishing, such as a battlement or a row of Tudor flowers, surmounting a screen, canopy, or other similarly subordinate part of a building. The term is sometimes applied to the finial of a gable or pinnacle.

Crest'ed, in heraldry, indicates that the comb of a cock, or other bird, is of a different tincture from the body. See BARBED AND CRESTED, WATTLED AND COMBED.

Cres'wick, Thomas, R.A., an English landscape-painter, was born at Sheffield, 1811, manifested in early youth a feeling for art, to gratify which he removed to London in 1828, and in the same year exhibited two landscapes in the Royal Academy, of which he was elected to the Associateship in 1842, and to the full honours in 1851. Sweetness of association and suggestion, together with an almost rigid fidelity to nature—from which he invariably painted direct—are the characteristics of his works, among the chief of which are 'The Course of the Greta,' 'The London Road a Century Ago,' 'Home by the Sands,' and 'The Weald of Kent.' C. died December 28, 1869.

Creta'ceous or **Chalk Rocks**, a group or series of rocks belonging to the Secondary, Mesozoic or 'middle life' period, lying above the Oolite or Jurassic system, and being topped in its turn by the Eocene rocks, or earliest formations belonging to the Kainozoic or Tertiary rocks. The name 'C.' is given to these rocks from the very general occurrence of chalk in them. The following are the leading divisions of this system, as recognised in Europe and America:—

Upper C.	1. Maestricht beds.
	2. Chalk.
	3. Upper Greensand.
	4. Gault.
Lower C.	5. Lower Greensand or Neocomian.
	6. Wealden.

The Wealden beds derive their name in England from their special development in the Wealds of Surrey, Sussex, and Kent. Their lower portion is known as the Hastings Sands, and attains a thickness of from 500 to 1000 feet. The upper portion is argillaceous or clayey, with sand and limestone layers, and is from 150 to 300 feet thick. The Lower Greensand or Neocomian in Britain is about 850 feet thick, and consists of sandstones and clays, the former sometimes of green colour from the presence of iron silicate. The *fossils* of the Wealden are fluviatile in nature, and consist of freshwater mussels, paludinæ or river snails, and the like. Those of the Greensand are of marine origin, and consist of shell and cuttlefish remains. The Gault occurs in the S.E. of England, and never exceeds 100 feet in thickness. The Upper Greensand varies in thickness from 3 to 100 feet, and consists of sands and clays. The true *Chalk*, composed of chalk-marl, white chalk without flints, and C. with flints, is well developed in the S. of England particularly, and is an extensive rock series. The Maestricht beds occur in Holland, and consist of yellowish limestone about 100 feet in thickness. In N. America the Lower C. R. are hardly represented. The Upper C. R. occur in the United States. *Foraminifera* (q. v.) are largely represented in the Chalk, the true Chalk containing those shells especially. *Corals*, *Echinoderms*, a few crustacea, many molluscs, fishes, reptiles, and birds also occur, but no mammals whatever are found.

Crete (Gr. *Kreta*, Mod. Gr. *Kriti*, Turk. *Kirid*, Ital. *Candia*, from Arab. *Khandai*, 'a trench'), an island and vilayet of Turkey, in the Mediterranean, to the S. of the Ægean Sea, has an area of 3290 sq. miles, and a pop. (1864) of 235,000, of whom 162,000 are Greeks and Jews, and 38,000 Mohammedans. It is 160 miles long from E. to W., and has a breadth of from 6 to 35 miles, while the coast, especially along the N., is indented by many deep bays. A mountain range traverses the island, culminating in the three groups of Sphakia (8100 feet) in the W., Pseloriti (8060 feet) in the centre, and Lasithi (7100 feet) in the E., and receiving in part the name *Leuci* from the ancients on account of the formation being of a whitish-tinted marble. There are few rivers of any size, but the island contains innumerable springs. The climate is mild and healthy. One-half of the soil is cultivated, yielding olives, Valonea nuts, locust beans, wine, tobacco, cotton, silk, &c. In 1874 the exports, chiefly olive oil and soap, amounted to £271,900. Canea (q. v.) is the capital, and the only other places of note are the seaports Candia and Retimo, the former of which had a pop. of some 15,000 previous to 1866, when it was in great part destroyed by storming. Besides the zaptiĕs or police, there are some 4000 regular troops, the support of which, together with the fortifying of Sudra Bay and the maintenance of a few forts, have swallowed up the public funds. The mule-roads of the interior are at times almost impassable, and no attempt is now made to replace bridges destroyed by the winter torrents. Modern Greek is the prevailing language. In early times this island was called *Idæa*, and in the mythic age it was said to have been ruled by Saturn, Jupiter, Minos, &c. The birthplace and tomb of Jupiter were shown by 'the lying Cretans.' During the heroic period the island was visited by Dorian invaders, who later made it the headquarters of the worship of Apollo. The Homeric poems speak of the 'ninety cities' of C., and long subsequently the inhabitants were still gathered into independent and often hostile towns. Afterwards Cnossus, Gortyna, and Cydonia (Kanea) became centres of states. C. held aloof from Greece during the historic period, was conquered by the Romans B.C. 67, attached to the eastern portion of the empire on its division (364 A.D.), came into the possession of the Arabs in 823, of the Byzantine Greeks once more in 961 of the Venetians, by purchase, in 1204, of the Turks, after twenty-four years' fighting, in 1668. Various unsuccessful attempts have been made to throw off the Turkish yoke and to unite C. to Greece, the latest and most determined effort being that of 1866-69. See Pashley, *Travels in C.* (2 vols. Lond. 1837); Raulin, *Descript. Phys. de l'Ile de Crète* (2 vols. Par. 1867); Alexanian, *La Turquie et la Crète* (1867).

Cre'tinism. See CAGOTS.

Creuse, a central department of France, in the basin of the Loire, has an area of 2153 sq. miles, and a pop. (1872) of 274,663. The country is hilly in the S., where it adjoins the mountain-land of Auvergne. The chief products are rye, buckwheat, oats, potatoes; but the soil in many parts is best fitted for pasturage, and cattle-rearing is the chief employment of the inhabitants, numbers of whom migrate to other parts of France in search of work. C. is divided into the arrondissements of Aubusson, Bourganeuf, Boussac, and Guéret. The chief town is Guéret.

The river C., rising in the S.E. of the department of the same name, pursues a N.W. direction for 148 miles, and joins the Viênne about 30 miles above the confluence of the latter with the Loire.

Creuz'er, Georg Friedrich, a German antiquary, born at Marburg, 10th March 1771, and studied at Jena. He became Professor of Rhetoric at Marburg in 1802, of Philology and Ancient History at Heidelberg from 1804 to 1848, and died 15th February 1858. His greatest work, *Symbolik und Mythologie der alten Völker, besonders der Griechen* (4 vols. Leips. 1810-12), of which an enlarged edition (6 vols.) appeared at Leipsic (1820-23), involved him in a controversy with G. Hermann. The grossly personal attack of Voss C. did not reply to. Among his other numerous works was a complete edition of Plotinus (3 vols. 4to, Oxf. 1835), a task for which he was eminently qualified by his knowledge of the Neo-Platonic philosophy. During 1837-47 he published a partial collection of his writings (*Deutsche Schriften*) in 9 vols., the last of which contains C.'s auto-

biography, *Aus dem Leben eines alten Professors.* A second edition was published at Paris, illustrated by extracts from Porphyrius and Proclus. His *Opuscula Selecta* appeared in 1854. See also *Paralipomena der Lebensskizze eines alten Professors* (Frankf. 1858).

Creuzot, Le, a town of France, in the department of Saône-et-Loire, about 20 miles W. of Chalons-sur-Saône. It lies in a district rich in coal and iron, and owes its immense prosperity to the enterprise of the late M. Schneider, President of the French Corps Legislatif under the Empire. The ironworks founded by him are among the most extensive in the world; there are foundries, engineers' works, and cannon factories. Locomotives, anchors, and all the heaviest iron manufactures are produced. About 6000 men are employed in these works. There is also a large glasswork. Pop. (1872) 20,011.

Crew, Ship's (Old Eng. *crudh*, 'a crowd'), the company of men belonging to a ship, vessel, or boat. The phrase may include the master and all the officers, but usually it denotes the non-commissioned officers and seamen only. The C. of a man-of-war is divided into subordinate and warrant officers, chief petty officers, first-class working petty officers, second-class working petty officers, and all below the last. Besides this five-fold classification there are smaller groups, each called a C., under the immediate orders of the boatswain, the cockswain, the carpenter, the cooper, &c. In the merchant service, the master sends a list of his C. to the customs authorities before he sails, and also within forty-eight hours after his arrival home.

Crewe ('the cross'), a town in Cheshire which owes its existence and prosperity to its being a central station of several important railways. The London and North-Western Railway Company have here their works for the construction of carriages and locomotives, and for the repairing of plant, employing (1876) over 7000 hands. In 1840 C. consisted of only a few houses; in 1871 the pop. was 17,810. The Church of St. Michael is a fine Gothic structure, and there is also a Wesleyan chapel (1876). and a good Mechanics' Institute

Crew'kerne ('the place of the cross'), a town of Somersetshire, 15 miles S.E. of Taunton, and a station on the Yeovil and Exeter branch of the London and South Western Railway. It lies in a wooded and fertile vale, not far from the river Parret, has a fine church (St Bartholomew), and a grammar-school founded by John de Coombe in 1449, and some manufactures of sailcloth, sacking, dowlas, and stockings. Pop. (1871) 3557.

Cribb'age, a popular game played with cards, in which generally two complete packs are employed, and the points made are marked with pegs which fit into holes arranged on the top of the box used for holding the C. cards. The game is interesting from the great variety of chances it offers, and at the same time it affords considerable opportunity for calculation and for the exercise of judgment.

Crichton, James, known on account of his learning and accomplishments as 'The Admirable C.,' was born at Elliock, Dumfriesshire, Scotland, August 19, 1560. He was the son of Robert Crichton of Elliock, who for a time held the office of Lord Advocate, and on the mother's side was descended from King Robert II. C. was educated at the University of St Andrews, where he was taught by Buchanan, and, according to the popular story, made such progress that, at the age of sixteen, he had mastered ten languages, the whole circle of the sciences, and all the accomplishments of a knight of the period. C. repaired to the Continent (1580), and, if his biographers are to be believed, vanquished in disputations at Paris, Rome, Venice, Padua, and Mantua, all who ventured to contend with him in eloquence and knowledge. He was not less successful in the tilting ring. At Mantua he killed in a duel a celebrated master of fence, who had vanquished all opponents, and in consequence of this the Duke of Mantua appointed him tutor to his son Vincenzo di Gonzago, a dissolute youth. During the Carnival of 1583, C. was assailed by a band of masked assassins at night, and, after a struggle, lost his life (July 3). It was believed at the time that it was his own pupil's hand that slew him. Some of C.'s Latin poems remain, but possess no merit. See Tytler's *Life of C.* (Edinb. 1819 and 1823), and *Relatione della qualita de Jacomo di Cretonne*, printed at Milan 1830-31, from a MS. dated 1581.

Crick'et (*Gryllus*), a genus of saltatorial or leaping Orthopterous insects, belonging to the family *Achetina* (or *Gryllina*). The antennæ are slender, tapering, and very long. The wings are laid flat along the back in repose. The hinder wings are very long, and project beyond the front wings (which form *elytra* or wing-cases when folded). The abdomen in both sexes is provided with two caudal bristles, and the females possess ovipositors. The tarsi are three-jointed. The hind-legs, as in all *Saltatoria*, are greatly elongated for leaping. The *chirp* of the C. is made by means of a serrated plate situated on each wing-cover, the friction of these plates producing the well-known sound. *G.* or *A. domestica* is the familiar or common C. The field-C. (*A. campestris*) is another species; the Mole-C. (q. v.) (*Gryllotalpa vulgaris*) is also a familiar member of this family.



Cricket.

Cricket (of doubtful derivation, but perhaps connected with the Old Eng. *cric*, 'a staff, a crook') is one of the most thoroughly national and popular of sports. The first mention of it under its present name is towards the close of the 17th c.; but it seems to have been a modification of the more ancient 'club-ball.' The southern and south-eastern counties of England have long been noted for their enthusiastic attachment to the game, which was very much confined to these districts at the beginning of this century; but so rapid has been its spread of late years, that there is scarcely a town, village, or school throughout Great Britain which does not boast of its C.-club. In the colonies and United States, too, wherever the English language is spoken, it is steadily gaining ground.

The requisite implements are wickets, bats, and a ball. The wickets, six in number, are 'pitched' in two sets of three each, the distance between the sets being 22 yards. During the progress of a game the centres of interest are the batsmen, who, bat in hand, stand each before one set of wickets. They are the only members of their side who are at that moment engaged in the game; the members of the other side are disposed in various positions, as bowler, wicket-keeper, and fielders. From the one set of wickets the bowler delivers the ball towards the other, with the object of hitting it; and it is the duty of the batsman to prevent this, as far as lies in his power, by stopping the ball with his bat, or, if possible, by hitting it to some vacant place in the field, thus, perhaps, gaining time to exchange places with the other batsman before the ball is returned, and scoring a 'run.' If, however, the ball when delivered by the bowler should strike the wickets, or if, though hit by the bat, it should be held by some fielder before it touch the ground, or if it should be returned to either end of the pitch, and should hit the wickets before the batsman has arrived there,—in these cases the batsman is 'out,' and must retire and give place to another. The wicket-keeper stands behind the wickets towards which the bowler bowls, and his duty is to stop the ball if it should pass both batsman and wickets, and to receive it when returned from the field. The latest innovation in the method of play is the now almost universal adoption of the *round-hand* style of bowling in preference to the original *under-hand* style. In the former style the ball is delivered with the hand and arm raised above or to the same height as the shoulder; in the latter, the arm is kept close to the side, and always below the shoulder.

The much greater speed of bowling which is possible with the round-hand style, has necessitated the improvement of leg-guards (pads) and gloves for both batters and wicket-keeper.

The maximum dimensions of bat, wicket, and ball, the length of the pitch, &c., are fixed by the authority of the Marylebone C.-Club; and only by its council can any change be made. It has lately been suggested to increase the length of the wickets by an inch or so, since the science of batting is cultivated to such a greater extent than that of bowling, and the scores made by individual batsmen reach such high numbers, that it seems almost impossible for a match of importance to be completed within two days. There is little question, however, that the large scores in many instances are due as much to indifferent fielding as to excellent batting. This is, indeed, one of the great weaknesses among gentlemen-players; and much of the success attending the professional elevens may be attributed to their generally superior proficiency in the field. The visits of the

'All England Eleven,' the pick of English professionals, to different parts of Britain and the Colonies, have done much to popularise the game. For a detailed account of the laws, bye-laws, disposal of the field according to the nature of the bowling, the reader must refer to one of the many handbooks on the subject, of which, perhaps, the best are *The C.-Field* (Lond. Longmans), Lillywhite's *Guide to Cricketers* (Lond. Kent & Co.), and Lillywhite's *Annual*, which contains accounts of the leading clubs throughout the kingdom, with notices of their more important matches.

Crick'lade, an ancient town of Wiltshire, on the right bank of the Thames, 40 miles N. of Salisbury, has a fine church (St Mary) in the Norman style. It has an important monthly market for fat cattle. It returns two members to Parliament. Pop. (1871) 6923; of the parliamentary borough, which includes part of Gloucestershire, 43,622.

Cricoid Cartilage, one of the cartilages of the larynx. See LARYNX.

Crieff (Gael. *Craobh*, 'a tree'), a town and parish in Perthshire, beautifully situated at the foot of the Grampians, on the banks of the Earn, 17 miles W. of Perth. On account of its fine climate it is much frequented by invalids. Its chief buildings are Morrison's Academy, Taylor's Institution, the hydropathic establishment, and the Masons' Hall, besides many fine mansions in the neighbourhood, of which Drummond Castle, with its curious gardens, Ochtertyre, and Ferntower, are the most noteworthy. Not far off, in the picturesque Glen Almond, is Trinity College (1847), for students of the Episcopal communion. A branch line, opened in 1856, connects C. with the Perth and Stirling Railway. The chief industries are the tanning of leather and the manufacture of coarse linens and worsteds. Pop. (1871) 4153. Lying as it does on the edge of the Highlands, C. was a suitable place in past times to inflict justice on the marauders from the hills. The 'kind gallows of C.,' where the Earls of Strathearn executed their sentences, stood on a knoll to the W. of the town. Among the places in the neighbourhood interesting from their beauty or their associations, are the 'Sma' Glen,' St Fillans, and Loch Earn.

Crill'on, Louis de Berton des Balbes, known as 'The Brave,' a singularly chivalrous warrior, was born at Murs, Provence, in 1541. Trained to arms under the Duc de Guise, he obtained at an early age a reputation for bravery, distinguishing himself especially at the siege of Calais and the capture of Guines. He became a great favourite both with Henri II. and Henri III., and was rewarded for his services with a number of Church benefices. In the 16th c. he took the side of the Roman Catholic Church against the Huguenots, fighting against the latter at Dieux, Jarnac, and Montcontour; but he had no share in the massacre of St Bartholomew, and was opposed to the Catholic League. After some years of devotion and penance, he died at Avignon, December 2, 1615. No soldier of his time has been more eulogised for his bravery than C. See L'Abbé de G.'s *Vie de Louis des Balbes de Berton de C.*, &c. (Par. 1825), Serviez' *Histoire du brave C.* (Par. 1844), and Montrond's *Histoire du brave C.* (Par. 1845).

Crime is a violation or disregard of public law of a certain gravity. It may be divided into three branches—Treason (q. v.), Felony (q. v.), and Misdemeanour (q. v.). Any act coming under either of these three divisions forms the subject of Indictment (q. v.) and of trial by jury. Minor offences which are not crimes are subject to the summary jurisdiction of the magistracy, without indictment or jury. There is no permanent characteristic of C.—one country and one age holding an act to be innocent, perhaps praiseworthy, which another age or another country holds to be highly criminal. Malice or evil intention is often the essence of C., and is in all cases an aggravation of it; yet C. may be committed without malice by culpable carelessness (see CULPA, DOTE), or even simply from ignorance of the law. (See BONA FIDES, IGNORANCE OF THE LAW.) Thus carelessness on the part of a railway official or the captain of a ship, if it lead to disaster, is criminal. So might it be held criminal to destroy a will, even though under the belief that so to do was of no consequence.

Infants under seven years of age, and insane persons, are legally incapable of C. The degree of insanity necessary for exculpation can never be defined. Compulsion (q. v.) is a sufficient defence, if clearly proved, against a criminal charge. Extreme want is not an exculpation, but it is good ground on which to found a recommendation to mercy.

Intention to commit a C., such intention having consequence, is criminal to the degree of the intention; thus, if A, intending to shoot B, shoot C, A commits a C. equal to killing B. Intention to commit C. is criminal, but to prove intention there must be some act. Such acts are punishable, but not necessarily to the same extent as the meditated C. But this rule of common law as to proof of criminal intention is modified under certain statutes, by which it is declared that certain circumstances, without action, shall be held to prove criminal intention against any one, who shall be punishable accordingly. For example, by 24 and 25 Vict. c. 96, it is declared that any one having in his possession, without lawful excuse, any crowbar or other implement of housebreaking, shall be guilty of a misdemeanour; the presumption here being that there is proof of intention to commit burglary, burglary being felony.

Crime'a (anc. *Chersonesus Taurica*), a peninsula in the S. of Russia, almost wholly surrounded by the waters of the Black Sea and the Sea of Azof, and connected with the mainland by the narrow isthmus of Perekop, which varies in breadth from 7 to 12 miles. It forms part of the Government of Taurida (q. v.), and has an area of 7650 sq. miles, with a coast-line of about 650 miles. The S.E. coast is bold and precipitous; but the N.E. is low and broken, and washed by the Sea of Azof, a portion of which, almost separated from the greater mass of water by the long narrow tongue of land known as the peninsula of Arabat, forms the stagnant Sivash (*putrid*) Sea, which gives rise to strong and offensive smells, and sometimes even dries up from the evaporation produced by the intense summer heat. The northern portion of the C. is a low, barren waste, abounding in numerous lakes and marshes of salt, which forms one of the staple exports of the country. The southern district, on the other hand, is rich, beautiful, and hilly, producing grain, olives, grapes, and even oranges, and richly adorned with the summer mansions of the Russian emperor and nobles. The highest peaks are the Kimal Agerek (5000 feet) and Tchatyr Dagh (4983 feet). The present capital is Simferopol (q. v.), in the interior. The other chief towns are Baktshiserai, Sebastopol, Karasubazar, Kaffa, Kertch, and Perekop. C. formed a Tartar Khanat under Turkey from 1478 to 1783, when it was subdued by Russia. Two-thirds of the inhabitants are Tartars. The place is especially interesting as the scene of the most important events of the war in 1854-55 between Russia and the allied French, English, Turkish, and Sardinian armies. See Kinglake's *History of the Invasion of the Crimea* (Lond. 1863-75), and Todleben's *Défense de Sevastopol* (St Petersb. 1864).

Cri'men Repetundarum, a term of Roman law, indicating the crime of acceptance of a bribe by a judge. See BARRATRY, BRIBERY.

Criminal, one who has been convicted of a crime. The accused is sometimes called the culprit or delinquent in England; in Scotland he is called the Panel (q. v.). See ACCESSARY OR ACCESSORY.

Criminal Courts. For England, see ASSIZE; NISI PRIUS; QUARTER SESSIONS, GENERAL; CRIMINAL COURT, CENTRAL. For Scotland, see ASSIZE; JUSTICIARY, COURT OF.

Criminal Court, Central, of the Old Bailey, is for the trial of crimes and offences committed in the metropolis and in adjacent districts. The sessions are held twelve times a year at least, and oftener if required. Offences on the high seas may be tried at this court.

Criminal Conversation is the legal term in actions of Divorce (q. v.) for the C. intercourse of the person against whom the action is brought. See ADULTERY.

Criminal Information. See INFORMATION.

Criminal Law. See CRIME, with articles referred to therein; also CRIMINAL STATUTES CONSOLIDATION ACTS.

Criminal Letters.—In Scotland, a criminal may be brought before the Court of Justiciary either by indictment or by C. L. These run in the name of the sovereign, and contain a warrant for citing the witnesses and jury.

Criminal Procedure. See ARRAIGNMENT, BAIL, COMMITMENT FOR TRIAL, INDICTMENT, INFORMATION. The accused having refused to answer, or pleaded *Not Guilty*, a jury is sworn, the indict-

ment opened, the evidence arraigned, examined, and enforced by the counsel for the prosecution. The accused then makes his defence, examining or cross-examining witnesses by his counsel or attorney. When the case for the prosecution is closed, the counsel for the prisoner addresses the jury, and he may examine witnesses for the defence. If he do so, unless the witness be to the character of the prisoner, the prosecuting counsel has the right to reply. The judge then sums up, and the jury deliberate on their Verdict (q. v.), till which be given they cannot be discharged. If they find the prisoner not guilty, he is liberated. If they find him guilty, he is said to be convicted. When the charge is capital (see CAPITAL PUNISHMENT), the prisoner is then asked if he has any reason to give why judgment should not be awarded against him. If he has nothing to say in Arrest of Judgment (q. v.), the judge pronounces sentence. If there be no reversal of judgment by any proceeding in error, the only other way of avoiding execution of sentence is by a REPRIEVE or PARDON (see those articles, also EXECUTION and EXECUTIONER). The above description of C. P. applies to England. While essentially the same in Scotland, the forms in that country are somewhat different. Regarding these differences, see ADVOCATE, LORD; ARRAIGNMENT, CALLING THE DIET, CRIMINAL LETTERS, INDICTMENT, NOT PROVEN, PRECOGNITION, PROSECUTION, PROSECUTOR, PROCURATOR-FISCAL, VERDICT.

Criminal Statutes Consolidation Acts.—These may be held to be the first practical result of the series of commissions appointed during the thirty years preceding their date. There are seven Acts, but one is only a repealing Act. The new statutes are principally a re-enactment of the consolidating Acts of the late Sir Robert Peel, with some improvements by giving a more exact description of offences, with a corresponding gradation in their punishments. They also endeavour more nearly to assimilate the criminal laws of England and Ireland.

Crim'son. See RED COLOURS.

Crinan Canal, The, 9 miles long, 24 feet broad, and 12 deep, with 15 locks, cut through the head of the peninsula of Cantire, between Loch Gilp and Loch Crinan, to avoid the long passage from the W. Highland coast to the Frith of Clyde round the Mull of Cantire. It cost £183,000, and can admit vessels of 200 tons. In February 1859 the reservoirs burst, when part of the banks was washed away and more than a mile of the canal choked with debris. To repair this the Government gave £12,000. For the year 1875-76 the receipts were £5057; the expenditure £4341.

Crined (Lat. *crinis*, 'hair'), in heraldry, means that the hair of a man or woman, or the mane of a horse, is tinctured differently from the body.

Crin'gles (Icel. *kringr*, 'a circle'), in nautical language, are loops in the bolt-ropes of sails, formed by intertwisting the strands of which the ropes are made, and commonly confining a metal ring or thimble. A rope passed through them gathers up the bolt-ropes.

Crinoid', or **Crinoi'dea**, an order of the class *Echinodermata* (q. v.), including the so-called fossil *Encrinites* (q. v.), or lily-stars, the *Comatula* (*Antedon*) *rosacea*, or rosy-feather star, the *Pentacrini* of tropic seas, &c., all of which are distinguished primarily by the fact that they are attached during the whole or a part of their existence to the sea-bed by a jointed flexible stalk. The genus *Rhizocrinus* is a good example of a typical existing C. The body, supported on this stalk, is enclosed in a *calyx*, or cup-shaped arrangement of calcareous plates, and the mouth is central, opening upwards, whilst the anus or vent may be present or absent. The arms, from five to ten in number, are not essential parts of the body, and are provided with *pinnules* or lateral branches. The arms are grooved, and currents of water carrying nutriment run down the grooves to the mouth. The ovaries exist beneath the skin in the grooves of the arms, and the ambulacral tubes are also situated there. The embryo is free-swimming and ciliated. The rosy-feather star is fixed in the early part of its life only, living latterly as a free, starfish-like form.

Crin'oline (from Fr. *crin*, Lat. *crinis*, 'hair'), a hooped petticoat made of horse-hair, or of thin hoops of whalebone or steel held horizontally by vertical bands, revived in France by Empress Eugenie in 1855, and shortly thereafter introduced into England. This garment had its origin in the *vertugade* or *vertugale* worn by ladies in France and Spain in the 16th c., which was introduced into England from Spain, under the corrupted name *farthingale*, in the reign of Queen Mary. In the succeeding reign of Elizabeth the 'wheel' and round farthingales attained enormous dimensions, and gave the wearers the appearance of standing in a drum or in a bell-shaped cage. Capricious fashion retained the farthingale till the time of Charles II., though it became more moderate in size, after which it gradually died out, only to reappear in the hooped petticoat of the 18th c., and the later C. The C., soon after its introduction, swelled considerably in circumference, and continued to be worn as a fashionable article of dress for a number of years, notwithstanding its obvious inelegance, the frequent loss of life occasioned by coming in contact with fire, and the ridicule and satirical treatment it received in certain public prints, till its general adoption by maid-servants and other inexplicable causes led to its disuse about 1866. A fabric composed of horse-hair and cotton, used for ladies' bonnets, is also known by the name 'C.'

Cri'num, a genus of very handsome plants, of the natural order *Amaryllidaceæ*, comprising numerous species, natives of Asia, Australia, S. America, and W. and S. Africa, while, owing to the period during which they have been cultivated in our gardens, many fine crosses (hybrids) have been introduced by the skill of the horticulturist—*e.g.*, *C. amabile*, probably a natural cross between *C. procerum* and *C. zeylanicum*. About the only species known to have any marked properties is *C. Asiaticum*, the bulbs of which are believed to be emetic, and as such are in some parts of the East employed in cases of poisoning. *C. Capense* of S. Africa is hardy enough to grow in a protected border in warm situations out of doors.



Crinum Longiflorum.

Cri'sis (Gr. 'a judgment,' from *krino*, 'I judge'), a term used by medical writers to denote a sudden change in the condition of the patient, significant of one or other of two things—death or recovery. C. is often accompanied by some marked phenomena, as intense sweating, diarrhœa, or a severe shivering. Apart altogether from the doctrine of a *materies morbi*, the law of periodicity in many acute diseases is of great importance, and one too often neglected. In some fevers there are *critical* hours, *e.g.*, in *Ague* (q. v.), when the paroxysm occurs at a fixed hour; in others there are *critical* days, *e.g.*, in small-pox, measles, and scarlet fever. The days on which the eruptions appear are important, and constitute crises. In some Fevers (q. v.), the seventh, fourteenth, and twenty-first days are also considered critical, but there is, perhaps, an admixture of medical superstition in such notions.

Cris'pin, St, according to the legend of the Church, was of Roman extraction and of noble birth. About the middle of the 3d c. he fled with his brother Crispianus from Rome to Gaul, where he settled in the town now called Soissons. While acting as a Christian missionary he made shoes for the poor, hence in later times, under the name of King C., he became and continues the patron saint of shoemakers. C. and his brother suffered martyrdom in 287, during the persecution of Diocletian. Their festival falls on the 25th of October.

Cris'ta, a term used in anatomy to denote a crest or ridge. Thus we have the *C. galli*, or cockscomb of the ethmoid bone, the *C. ilii*, or ridge round the rim of the iliac or hip bones, &c., &c.

Crith'mum. See SAMPHIRE.

Croa'tia, a kingdom of the Austro-Hungarian monarchy, forming with Austrian Slavonia (q. v.) a crown-land proper;

area, 16,780 sq. miles; pop. (1869) 1,846,150, exclusive of the military. It lies E. of the Adriatic Sea, and is partly bounded on the S.E. by Turkey. C. proper comprises the counties of Agram, Warasdin, Kreutz, and Fiume; and Slavonia, those of Pozega, Essek, and Syrmien. The Save and the Drave are the chief rivers. A great part of the country is traversed by a continuation of the Julian Alps, and deep valleys occur in the S., which have no outlet, important streams having to make their way underground. The climate varies much, and in the S. the *bora*, a boisterous wind, prevails from September to May. The soil is in many places fertile, and the vine, olive, fig, and mulberry are successfully cultivated. There are almost no manufactures. The capital is Agram. C. was at one time a separate *Banat* (q. v.). The Croatians, Slaves in blood and language, are for the most part Roman Catholics, with a sprinkling of Greek Catholics, though a considerable number belong to the Greek Church proper. The earliest historical inhabitants of C. were the Pannonians, who were subdued by Augustus. The Croats, or Horvats—*i.e.*, dwellers in the Carpathians, and after whom C. is now named—took possession of the territory in 640. At the end of the 12th c. it was incorporated with Hungary, with which it passed in 1526 into the possession of the Hapsburgs. Together with Slavonia, the *Litorale*, and Fiume, it was formed into a crown-land. During the Hungarian revolution, the long-standing jealousy of the Croats towards the Magyars found expression in the hostile action of the Ban Jellachich. The result was its separation from Hungary in 1849. During 1849-60 it was, like the other non-German parts of Austria, subjected to a centralising legislation; but on the 20th of October 1860, it received again its old national constitution.

Cro'chet-Work (Fr. *crochet*, 'a hook'), the name of a simple kind of fancy needlework in cotton or wool, worked with the aid of a hooked needle. Antimacassars, doyleys, &c., are commonly made with beautiful raised flower or star patterns of C.-W. The delicate Irish crochet-lace is much esteemed.

Crocid'olite (Gr. 'woolly stone'), a silicate of iron, composed of separable flexible fibres like asbestos, found chiefly in S. Africa. It has a pale-blue, green, or yellowish-brown colour, and when cut and polished *en cabochon*, it shows a chatoyant lustre.

Crock'ets (Fr. *crochet*, dim. of *croc*, 'a hook,' 'a crook'), in Gothic architecture, ornaments representing curved and bent foliage, and placed upon the angles of spires, canopies, and pinnacles, on gables, and on the weather mouldings of doors and windows. Occasionally C. are found in vertical mouldings, as at Lincoln Cathedral, but never in horizontal situations. About the time of the Renaissance, animals began to be substituted for leaves.

Croc'odile (*Crocodilus*), a genus of the Reptilian order *Crocodilia*, distinguished by the fact that the fourth tooth in the lower jaw is larger than the others, and forms a canine tooth, which is received into a pit excavated in the border of the upper jaw, so that it is visible externally when the mouth is shut. The hind-legs are bordered by a fringe of serrated or toothed conformation, and the toes are completely united by membranes. The snout is long, obtuse, and flattened. The crocodiles, as types of their order, present good examples of the dermal bony plates and scales forming their chain-armour. The teeth are implanted in distinct sockets, new teeth being developed from below, and ultimately displacing the old teeth. The vertebræ are procœlous—that is, hollow in front and convex behind—as in all living *Crocodiliæ*. The heart is four-chambered. No clavicles exist. Two vertebræ compose the sacrum. The Cloaca (q. v.) opens by a longitudinal aperture. The front feet have five, and the hinder ones four toes. The nose opens by a single nostril, and the hinder nostrils open very far back in the mouth, a conformation rendering it easy for these animals to drown their prey, whilst they breathe readily themselves. The tongue is attached to the floor of the mouth. The Nilotic C. (*C. Niloticus*) is the familiar species, attaining a length of from 20 to 30 feet. Species of true crocodiles also occur in Asia (such as the *C. palustris* and *C. biporcatus*), and in the New World, where the Alligators (q. v.) are also found.

Cro'cus, a genus of Iridaceous plants, mostly natives of Southern and Eastern Europe, and of Asia Minor, though a few extend as far N. as Central Europe. They have been long cultivated in most temperate or even northern parts of Europe and America for the sake of their beautiful flowers. Saffron (q. v.) is obtained from *C. sativus*, while *C. vernus*, *C. lagenæflorus* (and its variety *luteus*), *C. pyrenæus*, *C. reticulatus*, &c., are among the favourite garden species. The 'Cape C.' is *Gethyllis*, while the name Indian C. is sometimes applied to the orchideous *Pleiones*.



Crocus Sativus.

Crocus of An'timony is a compound of sulphide of sodium (Na_2S) and sulphide of antimony (Sb_2S_3), and is obtained during the extraction of antimony from its sulphide.

Crocus of Mars is the sesquioxide of iron (Fe_2O_3).

Crœ'sus, the last King of Lydia, succeeded his father Alyattes, B.C. 560. In the early years of his reign he pursued an unbroken career of conquest, until his dominions extended from the northern and western coasts of Asia Minor to the Halys on the E. and the Taurus on the S. When at the height of his wealth and grandeur, C. (according to a story told by Herodotus) asked Solon who was the happiest man he had ever seen. Solon replied that no man was to be deemed happy till his life had been happily closed. By an accident, and as it seemed to C. in fulfilment of a dream, he lost his accomplished son Atys while hunting. C. grew jealous of the rapidly-rising power of Cyrus, and determined to attack him; but, before doing so, he elicited from the Pythia the memorable instances of the ambiguity of ancient oracles—that if he marched against the Persians he would overthrow a great empire; and that he should flee along the Hermus when a mule became King of the Medes. C. encountered Cyrus in an indecisive battle in Cappadocia, and fell back on Sardis, where he was totally defeated by Cyrus, who, fourteen days thereafter, took the city. C. was condemned to be burned, and when on the pyre, remembering the words of Solon, thrice uttered his name. On receiving an explanation of this occurrence, Cyrus released C., gave him Barene, near Ecbatana, as a residence, and treated him as a friend. C. accompanied Cambyses on his expedition into Egypt. How or when he died is unknown.

Croft, William, D.Mus., one of the greatest English cathedral composers, was born in 1657, and educated under Dr Blow, whom he afterwards succeeded (1708) in his office at the Chapel Royal, and as organist at Westminster Abbey. He received the degree of Doctor of Music from the University of Oxford in 1715, and in 1724 published *Musica Sacra*, a collection of anthems,—the first music printed from engraved plates. He died in August 1727, and was buried in Westminster Abbey. His compositions are almost all anthems, very many of which are still sung frequently in English churches. In their own department they have seldom, if ever, been surpassed.

Cro'ia, or **Cro'ja**, the birthplace of the famous Scanderbeg, is a town in the vilayet of Prisren, European Turkey, 45 miles S.S.E. of Scutari, on a height 500 feet above the plain, and defended by a castle. Pop. 6000.

Croix, St, or **Santa Cruz**, an island in the W. Indies, E. of Porto Rico, and belonging to Denmark. Area, 74 sq. miles; pop. (1870) 22,760. It is very fertile, and almost every inch of ground is cultivated. The chief town is Christianstad.—C. is also the name of a river which flows into the Bay of Fundy, N. America, after a course of 55 miles, and serves as the boundary between the state of Maine and the province of New Brunswick, in the Dominion of Canada.

Cro'ker, John Wilson, a politician and man of letters, who had a considerable reputation in his time, was born in Galway, Ireland, December 20, 1780. He studied at Trinity College, Dublin, and at Lincoln's Inn, London, and was called to the Irish bar

in 1802. Some clever satires, and a *Treatise on the State of Ireland, Past and Present*, brought him into prominence, and in 1807 he was elected member for Downpatrick. Two years later a defence of the Duke of York obtained for him the appointment of Secretary to the Admiralty, which he held for twenty years. C. is perhaps best known by his articles and reviews in the *Quarterly Review*, of which he was one of the founders, which were remarkable even in that day for their savage partisanship and the extreme bitterness of their personalities, by the clever caricature of him, under the name of 'Rigby,' in Mr Disraeli's *Coningsby*, and by his annotated edition of Boswell's *Life of Johnson*, which was severely criticised by Macaulay in the *Edinburgh Review*. C. rendered, however, some really valuable services both to literature and to art, and he deserves honourable mention for his active part in the establishment of the Athenæum Club. He died at Moulsey, near Hampton Court, August 10, 1857.

Croker, T. Crofton, a popular collector and author of Irish stories and legends, was born at Cork, 15th January 1798, and, through the influence of his friend, though not relation, John Wilson C., obtained, at the age of twenty-one, a clerkship in the Admiralty, in which he rose till he had a salary of £800 a year. Among his collections of stories of Ireland, his *Researches in the South of Ireland* and *Fairy Legends and Traditions of the South of Ireland* (1825) are perhaps the most interesting. All his books, especially such essentially original ones as *Barney Mahoney*, are marked by humour and pathos, both genuine and both truly Irish. C., who was an enthusiastic antiquarian, retired from the Admiralty in 1850 on a good pension. He died at London, 8th August 1854.

Cro'ly, Rev. George, D.D., a most indefatigable writer of romances, magazine articles, and poems, and an eloquent preacher, was born at Dublin in 1785, and died rector of St Stephen's, Walbrook, London, 24th November 1860. C. was a man of versatile talents, and, had he written less, his reputation might have been more permanent. The romance *Salathiel* is perhaps the work of his that will live longest.

Crom'arty, a burgh and seaport in Ross and C., at the N.E. extremity of the peninsula which separates the Moray from the C. Firth, has an antique appearance from the houses in the older streets being built in the quaint Flemish style. The chief industry—the herring and white fishing—has declined of late, but there are manufactures of sacking, some cooperages, and a brewery. C. unites with Wick, Dingwall, Dornoch, Kirkwall, and Tain in returning a member to Parliament. Pop. (1871) 1476. Hugh Miller was a native of C.

Cromarty Firth, an inlet of the N. Sea, in the united counties of Ross and C., opening out from the Moray Firth, 18 miles long and from 3 to 5 miles broad. It is completely landlocked, and has sufficient depth of water to furnish anchorage for the largest navy. The entrance, 1½ miles wide, is between the N. and S. Sutors, two lofty wooded headlands, which have been vividly described by Hugh Miller. The towns of C., Dingwall, and Invergordon are on the shores of C. F.

Cromartyshire, in the N. of Scotland, consists of numerous detached portions scattered widely over Ross-shire. Area, 344 sq. miles. These two shires now form a single county. See Ross and Cromarty.

Crom'dale (Gael. 'winding valley'), a village on the E. bank of the Spey, till 1870 included in Inverness-shire, but since that date in Elgin, by Act 33 and 34 Vict. c. 16. Here, on May 1, 1690, the troops of William III. defeated a small body of Jacobites. This skirmish forms the subject of the song known as *The Haughs of C.* Pop. of parish (1871), 3817.

Cro'mer, a parish and fishing village on a bay of the same name, Norfolkshire, 21 miles N. of Norwich. It has a splendid beach for sea-bathing, but the bay is called by the natives the Devil's Throat, so dangerous is it to navigation. C. carries on a small coasting trade. Pop. of parish (1871), 1423.

Crom'lech (Celt. 'an inclined flat stone') is the name given to one of the unsculptured stone monuments of the Celtic races, commonly called *Druidical stones*. The C. has been defined as a large stone placed like a table, but in an inclined position, upon other stones set up on end. A rude chamber is thus formed within; hence the popular names of 'giant's grave,' 'hag's bed,' &c. There is not, however, in such monuments one unvarying type of construction; the *Logan*, or rocking-stone, and the *monolith*, or unhewn pillar standing alone, are perfectly distinct, but the C. merges into the *circle* and the *altar*, which are also found largely on the N.E. coast of Scotland, and on the diluvial plain between Loch Awe and the Crinan Canal. Stenness, in Orkney, and Callernish, in the Lewis, are the sites of the most conspicuous groups. The *dolmen* of Brittany and other parts of France is the same as C. Two of the largest cromlechs are at Plas Newydd, in Anglesea. Kit's Coty House, in Kent, and Chun Quoit, in Cornwall, may also be mentioned. The fact that cromlechs are sometimes surrounded (as 'The Broadstone,' County Antrim) by a circle of standing stones, long gave currency to the view that they were Druidical remains. Because human remains, with the usual accompaniments, have been found in churches, they have been set down as sepulchres. Dr Hibbert regarded those of Orkney as equivalent to the Scandinavian *tings*, and it is certain that 'stannin' stanes' were frequently used for the purpose of assembling courts of justice. Astronomical meanings and serpent-worship have also been read into these remains by antiquaries. Fergusson says they are the work of partially civilised races who had come into contact with the Romans. No approximate dates are known.

Cromp'ton, Samuel, an English inventor, was born at Firwood, near Bolton, Lancashire, December 3, 1753. His father was a farmer, but, like many farmers at that time, also a carder and spinner. C. lost his father when only five; but his mother gave him the best education which could be obtained in the district. When old enough he worked at the loom in his uncle's mansion, called the Hall-i'-th'-Wood, and at the age of twenty-one became so dissatisfied with Hargreave's machine that he turned his attention to inventing a better one. For five years he worked at this project, thus employing many of his night hours after his day's weaving was over. At last he succeeded; but his success brought him little pecuniary returns; for, unable from lack of means to patent his invention, he was at length forced to disclose the principle, under promise of a liberal subscription. The subscription amounted to £60! Latterly he received a reward of £5000, with which, however, he could not compete successfully with the wealthier manufacturers, who had largely made use of his machine. C. died June 26, 1827. His invention was called the spinning-mule, from its partaking of two leading characters of Arkwright's machine and Hargreave's spinning-jenny. See French's *Life of C.* (1860).

Crom'well, Oliver, was born of good family at Huntingdon, April 25, 1599. His father, Robert C., who sat as M.P. for Huntingdon in the Parliament of 1593, was a younger son of Sir Henry C. of Hinchinbrook, while through his mother, Elizabeth Steward, he was connected with the families of Hampden and St John, and even, it is asserted, with the House of Stuart. He was educated at school at Huntingdon, and afterwards at Sidney-Sussex College, Cambridge. From the latter, however, he was recalled by the death of his father, and settled first on the family estate of Huntingdon, and subsequently on a farm at St Ives, marrying in 1620 Elizabeth, daughter of Sir James Bourchier, a gentleman of landed property in Essex. C. soon associated himself with the Puritan party, being perhaps prompted to do so by natural melancholy, which showed itself in early years in fancies of approaching death. He was first returned to Parliament in 1628, for the borough of Huntingdon, but did not take an active part in its proceedings for a time, although he actively opposed the tyranny of King Charles, by resisting his schemes for the drainage of the Fens. In 1640 he took his seat for the burgh of Cambridge, and soon was 'much hearkened to' as a member of the Parliamentary party. He threw himself with heart and soul into the war, fought with a troop of his own raising at Edgehill, and spent his substance in equipping two companies, which, in 1642, he asked the permission of Parliament to raise; and it was he who saw the great advantage that would be derived from enlisting religious enthusiasm and stern morality on the side of the Parliament. He began with his own regiment, which became famous as 'the Ironsides,' and the experiment proving successful, his policy was extended to the whole army, henceforth known as the New Model. C., who had rapidly advanced to the position of colonel, distinguished himself

greatly at the battles of Marston Moor, 3d July 1644, and Newbury, and when the celebrated 'self-denying ordinance' was passed, became lieutenant-general of the Parliament forces under Fairfax, and as such commanded the right wing of the Parliamentary army at the decisive battle of Naseby, 14th June 1645. From that time to his death C.'s history is the history of his country. After the King fell into the hands of Parliament, he crushed the insurrection of the Scots in favour of the King, at Preston Moor, 17th August 1648. After the execution of the King he was appointed lieutenant-general, and quickly and surely stamped out a rebellion in Ireland. When the young prince, afterwards Charles II., landed in Scotland, C. superseded Presbyterian and wavering Fairfax, marched into that country, and totally defeated the Scotch under Leslie at Dunbar, September 3, 1650. The Royalists having invaded England, C. gained a final victory at Worcester, September 3, 1651. C. now found himself at variance with the Rump, which had become a mere clique of crotcheteers and talkers, and dissolved it, 20th April 1653. He summoned a new Parliament, but was compelled to dissolve it also, although not before it had invested him with the title of Lord Protector. From thence to his death, although he repeatedly summoned Parliaments, he was really absolute ruler of England; and the country never was more respected and feared abroad than during the Protectorship of C.; and although he was never popular, and was in constant danger of assassination, even his enemies admitted the wisdom of his domestic measures. After a brilliant but yet melancholy term of solitary power, he died September 3, 1658, on the anniversary of some of his greatest victories. In 1661 his remains were dragged by brutal Royalists from their resting-place in Westminster Abbey, and, along with those of Bradshaw and Ireton, hanged at Tyburn. For some time after his death C. was looked upon as a fanatic, tyrant, and hypocrite; but that shallow and ignoble hypothesis has been banished from historical literature by the industry and genius of Carlyle. He now ranks as perhaps the greatest and (circumstances considered) wisest ruler England has ever had. While his religion was emphatically a matter of the heart and soul, he was no bigot, as the manner in which he protected the Jews, and even the Unitarian Biddle, showed. In his brilliant foreign policy there occurred perhaps only one mistake—his considering Spain, and not France, as the Roman Catholic power in Europe most to be feared. See Carlyle's *O. C.'s Letters and Speeches, with Elucidations*, Guizot's *Histoire de la Révolution d'Angleterre*, and Green's *Short History of the English People* (Lond. 1875).

RICHARD C., eldest son of the preceding, was born at Huntingdon, October 4, 1626. When his father became Lord Protector, he made his son First Lord of Trade and Navigation and Chancellor of Oxford. Richard proved, however, a feeble, indolent, and self-indulgent man; and when, on his father's death in 1658, he succeeded him as Lord Protector, he was unable to contend against the factions that opposed him in Parliament and in the army, and resigned his post seven months after accepting it. He went to the Continent, and returned in 1680, when he assumed the name of Clarke, and lived in retirement at Cheshunt. There he died in 1712.

Cromwell, Thomas, the real author of the great ecclesiastical and political revolution accomplished in the reign of Henry VIII., and of whom it has been well said that, 'in the whole line of English statesmen, there is no one of whom we would willingly know so much, no one of whom we really know so little,' was born about 1490 near London, and in humble circumstances, the popular story being that his father was a blacksmith at Putney. For a time he led a roving, adventurous life, was engaged when a mere boy in the service of the Marchioness of Dorset, and took part in the Italian war as a common soldier or 'ruffian,' as he described himself on one occasion to Cranmer, obtaining, however, a knowledge both of the language and of the politics of Italy. He next appears as a commercial agent to a Venetian merchant, and clerk to a factory at Antwerp, and, probably after another visit to Italy, he returned to England about 1517. At all events, he is found about the beginning of the reign of Henry VIII. as a thriving wool merchant and scrivener in Middleborough. C. now took an active interest in political life, and became a member of the House of Commons. The turning-point in his life, however, was his becoming the confidential servant of Wolsey, who employed him in the unpopular work of suppressing some of the smaller monasteries, and transferring their revenues to Ipswich and Oxford. C. stood by his master to the last, and chivalrously and successfully defended him against the bill of impeachment in the House of Commons. Owing, perhaps, to his suggestion that the King should substitute his own supremacy in the Church for that of the Pope, Henry took him into favour, and made him his secretary and a privy councillor. He rose rapidly from post to post and from honour to honour, and when at length he was made Lord Chamberlain and Earl of Essex, he was the most powerful subject and statesman in Great Britain. He had conceived a definite policy, and carried it relentlessly through. It was to render the King the centre of all authority in England, by reducing the Church, in the language of Mr Green (*Short History of the English People*), 'to a mere department of the State, in which all authority should flow from the sovereign alone, and in which his will should be the only law, his decision the only test of truth.' C. did not succeed to the extent he intended, but still he was so far able to accomplish his intentions, that to this day the polity of the Church of England remains substantially the same as it was created by him. It will always be remembered to his credit that, although perhaps for purely political reasons, he took a prominent part in establishing Reformation principles, he had English Bibles placed in the churches, and had the youth of the nation taught the Creed, the Ten Commandments, and the Lord's Prayer. His policy—particularly his maintaining a large army of spies, his sending to the block every one that opposed his measures, and the resolute manner in which he put down monasteries, securing for him the title of *Malleus Monachorum* -raised him up a host of enemies. Many complaints regarding him were presented to the King, who in the end deserted C. for promoting the marriage with Anne of Cleves, to whom Henry had taken a dislike. Ultimately C. was arrested and thrown into prison, and being condemned on the charges of treason and malversation, was executed on Tower Hill, 28th July 1540.

Cronstadt. See KRONSTADT.

Crook, a lengthening tube used in brass instruments, which enables them to be played with the same fingering in different keys.

Crook'ed Island, one of the Bahamas, 27 miles E. of the S. point of Long Island, from which it is separated by C. I. Passage. Area, about 80 sq. miles; pop. between 600 and 700. Like most other islands of the group, it has a considerable export trade in salt.

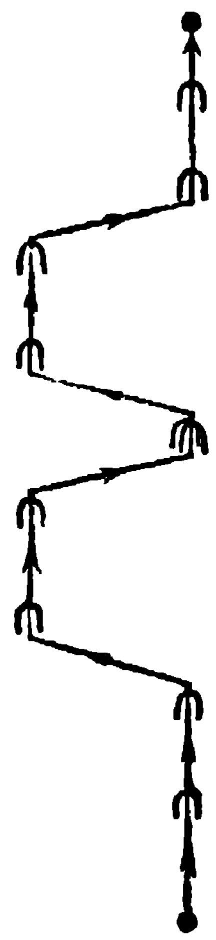
Crop, or **Outcrop**, is the place where a stratum rises to the surface of the ground. It corresponds to the *strike* on a level area. See DIP AND STRIKE.

Crop. In Scotland, the landlord has a Hypothec (q. v.) over the C. for the rent of the year of which it is the C.; and the right continues in force so long as the C. remains in the tenant's possession.

Cropp'ing, a term of the agricultural law of Scotland indicating stipulated or implied conditions of farming under a lease. What is called the *clause of management* is now generally inserted in leases. It provides, among other things, for a variety or rotation of crops. This rotation varies according to the soil, climate, and other circumstance of the farm. Even in the absence of such a clause, there is an implied obligation on the tenant to cultivate according to the rules of good husbandry. By common law a tenant is restrained from such gross mismanagement as will injure or overwork the soil. It is generally provided that white corn crops (*i.e.*, crops which are allowed to ripen) shall never be taken from the same land in immediate succession, and that a certain proportion shall be under turnips, or plain fallow, every year, and be sown to grass with the first corn crop after turnips or fallow. The clause is generally enforced by penalty in case of contravention, as to which the law is, that the tenant is not entitled to pay the penalty and to infringe the clause.

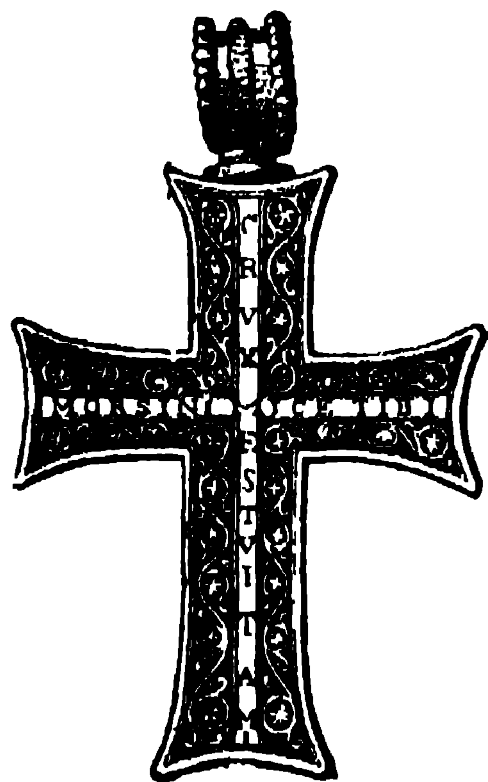
Cro'quet, perhaps a modification of the old game of Pall-mall, is a favourite lawn amusement of modern origin, played by any number of persons up to eight, either individually or on 'sides.' The necessary implements of the game are wooden mallets, balls, also of wood, a pair of pegs, and iron hoops or rings. The rings are arranged in a variety of ways, a common

form being shown in the accompanying diagram, and the pegs are placed at the starting and turning points of the game respectively. The object of the game is to drive the balls with the mallets through the rings outward, in the order shown in the diagram, and after 'pegging'—*i.e.*, hitting the peg at the upper end—to return home in a corresponding order, taking the rings on the off-side. On pegging at the home-end, the player has finished, and winning is reckoned according to the order in which this is accomplished. The various rules of this interesting and healthful game are well laid down in Jacques' *Laws and Regulations of the Game of C.*


Croquet.

Cro'sier (Med. Lat. *crocia*, from *crux*, 'a cross'), the pastoral staff of an archbishop, surmounted by a cross, and so distinguished from that of a bishop, the head of which is a crook. This distinction between the cross and the crook dates back to the 12th c. The C. is about 5 feet long, made of tin, hollow, generally gilt, and often richly ornamented.

Cross (Lat. *crux*, 'a pale or stake,' 'a cross'), two pieces of wood placed transversely, and anciently used in a mode of punishment which probably arose from the custom of fastening culprits or prisoners to trees, and leaving them to die by hunger or by wild beasts. The Persians, Syrians, Phœnicians, Egyptians, and Carthaginians used this mode of capital punishment, which was at Rome, under the government of the kings, inflicted on persons of all conditions in life, but later only on slaves and the vilest malefactors. According to Roman law, the sufferer was first scourged, and then compelled to carry his C. to the place of execution, outside the town in which the sentence had been passed. Here he was stripped naked, and fastened to the C. by tying or nailing. The punishment was abolished in the time of Constantine. Instances are on record of persons being taken down and surviving after remaining some time on the C. During the reign of Louis XV. of France, several women (religious enthusiasts called *convulsionaires*) voluntarily underwent crucifixion as a part of their religious services.


Reliquary Cross from St Lorenzo, before Rome.

The C. was in form either simple or composite. The simple C. (*crux simplex*) was a mere stake on which the condemned was impaled (*infixus*), or on which he was fastened by the hands crossed above his head (*affixus*). A tree—hence Seneca's phrase, *infelix lignum*, the 'accursed tree'—was convenient for the purpose. There were several forms of the composite C. (*crux compacta*). The most common, the *crux decussata*—resembling the letter X, from *decussis*, the number ten—is also called St Andrew's C., implying that that saint was crucified on an instrument of this shape. Another form, the Tau-C. (*crux immissa*), was shaped like the Greek letter *tau* or T. It is called St Anthony's C., because it was said to have been embroidered on that saint's cope. A variety of this is the *crux ansata* C. with a handle—from *ansa*, 'a handle.' It has a circle at the head of the upright beam, is found on Assyrian and Egyptian sculptures, also among the Copts, Indians, and Persians, and is supposed to have been the symbol of a divinity, or an emblem of life. The most historically famous is the *crux immissa* or *crux capitata*—the Latin or High C.—which has the longer upright beam, or *stirpes*, projecting above the cross-piece or *patibulum*. This is held by tradition to be the form of C. on which Jesus Christ was crucified; the *titulus*, or accusation on which he suffered, being placed above his head seems to confirm this supposition; and a further confirmation is, that this C. is repeatedly found on the coins and columns of Constantine the Great. The Greek Church represents the instrument on which Jesus Christ was crucified as having the transverse beam laid across the middle of the upright one, both being equal. This shape is called the Greek C.

The C. became an object of veneration to Christians after the crucifixion of Christ. The early Christians multiplied models of it; and after Constantine's victory in 312 over Maxentius, through the influence, as he professed to believe, of the sign of the C. which he is said to have seen in the sky, it began to be set up in public places and on public buildings. Then also the custom of crossing, or making in the air with the hand the sign of the C., began to prevail. It was not till the 6th c. that the bare emblem of the C. was transformed into the image of the Crucifix (q. v.).

The festival of the 'Invention of the C.' is held on the 3d of May, and that of the 'Elevation' on the 14th of September. The former commemorates the alleged finding of the true C., in the year 326, by the Empress Helena, mother of Constantine; the latter its re-erection, in the year 628, at Jerusalem by the Emperor Heraclius, after it had been carried away by the Persians.

The C. has been deeply impressed on all the external features of Christian civilisation. It has been extensively used as the ground-plan of churches. The plan of the Cathedral of St Mark, Venice, is a Greek C.; that of St Peter's is a Latin C. (q. v.). Churches commonly exhibit the C. on their gable-ends. It was early borne, as it still is, in ecclesiastical processions; an enormous C. made of wood and cardboard is carried in some of these processions at Rome, balanced in a waistband round the body of a man. The C. placed over the altar is called the *Rood* (q. v.), or *holy rood*.

As an ornament of Christian art, the C. has exercised the ingenuity of artists in all ages. The Romanesque period indulged in great luxury in this respect, a wooden C. being overlaid with gold or silver, and ornamented with jewels, gems, pearls, enamelled representations, and filigree work. In the Gothic epoch, the C. had generally the ends of its four arms trefoiled. Reliquaries of the most elaborate description were constantly made in the shape of a C.

The memorial C. has in all the ages of Christianity been a favourite mode of expressing regret for the dead. It is used for this purpose in all its shapes in places of interment. One form of it, the Norman C., is a Gothic turret, either standing on the ground or elevated a few steps. Waltham C., near London, erected by Edward I. in memory of his Queen Eleanor, and recently restored, with questionable taste, is a good specimen. The Runic C., said to be of Scandinavian origin, and named after the Runes (q. v.), in which its inscriptions are written, seems to have been frequently set up in memory of some hero of the state or of the Church—some king, warrior, or bishop. There were formerly many of these in the Island of Iona, but now only one remains—St Martin's, in the cathedral grounds. They were common in Ireland—St Luke's, which still stands in the county of Louth, being of huge dimensions.

The sanctuary or boundary C. marked off Church lands, and showed the people on their way to church where to kneel when they were entering sacred grounds. One of these latter is still to be seen on a field near the parish church of Kilhoman, Islay.

The market-C. has left its name where it stood in many towns of England and Scotland. It is noticeable that in some towns of Ireland the market-place is called the *diamond*—probably owing to its diagonals being a Greek C. Some of the most famous of English market-crosses, as at Salisbury, Chichester, Bristol, and Winchester, are designed with niches, and vaulted, leaving an open chamber. These crosses seem to have been used as *preaching stations*; notably St Paul's C., London, of which we read as early as the middle of the 13th c. The neighbouring cathedral, St Paul's, is surmounted by one of the largest constructed crosses in the world, a rival to that on St Peter's at Rome.

Cross, in heraldry, one of the honourable ordinaries, may be regarded as a combination of a fesse with a pale. It was usual for the Christian warriors in the crusades and for pilgrims to the Holy Land to wear it as a badge. The varieties of the C. are very numerous; but when the blazon is a simple St George's C., it is always understood as meaning the honourable ordinary. There are two classes of the ornamental C.—those in which the extremities reach to the outer edge of the shield, and those which

are Couped (q. v.). See Lipsius, *De Cruce;* Gretser, *De Cruce Christi;* and Lubke, *Ecclesiastical Art in Germany*, &c., also Eng. trans. (T. C. Jack, Edinb. 1873).

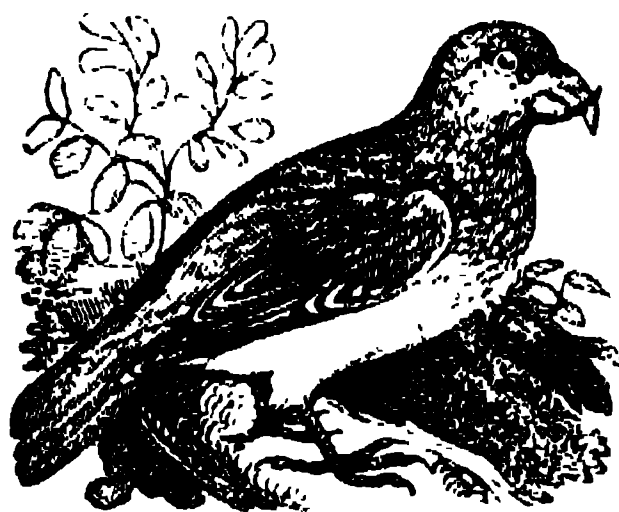
Cross, Order of the, an ecclesiastical order of knighthood which arose in Palestine during the crusades, as the Bethlehemite Order, but now has its chief seat in Bohemia, where Church dignitaries and professors of the University of Prague are among its members. In the 13th c. the knights of this order became monks, and in 1328 were confirmed by Pope Gregory IX. as a monastic community. They settled chiefly in Poland, Austria, Moravia, Silesia, and Bohemia. Their badge is a C. of red satin, with a six-pointed star under it; hence they are sometimes called *stelliferi* or star-bearers.

Cross, the Southern, a bright constellation of the southern hemisphere, consisting of four stars, the line joining two of which points to the S. pole, forming with the line joining the other two a very perfect C. The brightest star is nearest the pole, and is between the first and second magnitudes.

Cross, Victoria, a British order, instituted for eminent personal valour in 1856, at the close of the Crimean War. A single act of valour may win this decoration, and it is granted to a soldier of any rank, as in the cases of Lieutenant Marsham Havelock, son of the famous general Sir Henry Havelock, at the battle of Cawnpore, and Lieutenants Salkeld and Home, Sergeant Smith, and Bugler Hawthorne, at the blowing-in of the Cashmere Gate in 1857, during the suppression of the Indian Mutiny. The order is said to have been founded in imitation of the French C. of the Legion of Honour; but it resembles the ancient English decoration of the partially-created baron, called a Banneret (q. v.). The badge is a bronze Maltese C., charged with the royal crown and lion crest, below which is inscribed the motto, 'For Valour.' On the clasp, from which the letter 'V' hooks the C., there are two branches of laurel; and the ribbon is red for the army, blue for the navy. The pension accompanying this decoration is £10 a year.

Cross-Bill in Chancery is a suit in Chancery instituted by a defendant against the plaintiff in a pending suit, for the purpose of making a claim or defence which cannot be made in that suit. See regarding Scotch law, CONJOINING OF PROCESSES.

Cross'bill (*Loxia*), a genus of Conirostral (*Insessorial*) birds, of the sub-family *Loxinæ*, in which the mandibles of the bill are hooked or crossed, and compressed at their tips. The head is large, and the bill strong. These birds feed on the seeds of pine-cones, and their bills are well adapted for extracting the seeds and for crushing the cones. The common C. (*Loxia curvirostra*), the parrot C. (*L. pityopsittacus*), and the white-winged C. (*L. leucoptera*), occur in Britain. The first species is common in Europe and in N. America, where the last species is also found. The common species rarely breeds in Britain. The nest is of grass and twigs and placed at the top of pine-trees.


Crossbill.

Cross'bow. See ARBALEST, ARCHERY.

Cross-Buns, Good-Friday cakes with a cross upon them, long popular in England, where they are hawked about the streets of many towns with the cry, 'Hot cross-buns.' The origin of this practice is not known; it is perhaps a relic of a heathen custom adopted by the early Christian Church.

Crosse, Andrew, an eminent electrician, was born at Fyne Court, Broomfield, Somersetshire, June 17, 1784. After studying at Oxford, he returned to his family seat in 1805, where he devoted himself to electricity. C. made many successful experiments regarding the formation of crystals, and formed numerous artificial minerals through the agency of voltaic currents. He communicated his discoveries of thirty years' labour to the British Association in 1836, and was highly commended by many scientific men. His most wonderful discovery was the apparent generation of certain *acari* between the electrodes immersed in a highly caustic solution. For this he was charged with impiety, and was forced to defend himself. C. died July 6, 1855. His widow published a memoir of his life and labours (1857).

Cross-Examination. The following are, in England, the chief rules affecting C.-E. Leading questions may be put; irrelevant questions for the purpose of injuring the credibility of the witness are inadmissible; when not put for this purpose, some latitude in questioning is usually allowed. The witness may be asked if he has been guilty of a specified crime, but he is not bound to answer. See EVIDENCE.

Crossopo'dia, the name given to certain kinds of *worm-markings* or *tracts* occurring in the Silurian and other rocks, and formerly, but erroneously, described as consisting of the *body* or actual fossil of the worm itself. *C. Scotica* of the Silurian rocks is a good example of these appearances, which are similar to those produced on modern coasts by marine worms burrowing in or trailing across the sand.

Crossopteryg'idæ, a division of Ganoid (q. v.) fishes, so named from the fin-rays of the pectoral and ventral fins being arranged so as to form a *fringe* around a central lobe. The living Barramunda (q. v.), or *Ceratodus* of Australian rivers, shows this arrangement of the fins; whilst the *Polypterus* of the Nile, and the extinct genera *Osteolepis*, *Megalichthys*, *Holoptychius*, &c., are good fossil illustrations of the 'fringe-finned' ganoids.

Crotala'ria. See BENGAL HEMP.

Crotal'idæ, a family of Viperine snakes, represented by the *Crotalus horridus*, or Rattlesnake (q. v.) of N. America, and distinguished by the presence of a deep pit on each side of the nose behind the nostril. The head is broad and flat, scaly on the crown, and scutellate on its sides and on the nose. The teeth are small; no teeth save the fangs existing in the upper jaw. The belly is covered with broad shields. The tail may be provided with a rattle or with a spine.

Cro'taphite, the name given by the older anatomists to the temporal muscle on the side of the head, from *krotaphos*, 'the temple.' The term was also applied to the temporal bones and arteries.

Crotch, William, an English musician, born at Norwich in 1775. In 1797 he obtained the degree of Doctor of Music at Oxford, when he became Professor of Music, and in 1822 became Principal of the Royal Academy of Music. His anthems are his best-known compositions, but he wrote also for the organ and piano. He was the author also of some good theoretical works. He died 29th December 1847.

Crotchet. See MUSIC.

Cro'to, or Cro'ton. See COTRONE.

Croton, a genus of Euphorbiaceous plants. The seeds of *C. Tiglium* yield Croton Oil (q. v.). The seeds of *C. Pavana* and *C. Polyandrum* are also purgative. Most of the species are aromatic. Among these may be ranked *C. Eleutheria*, of the island of Eleuthera, one of the Bahamas, which yields cascarilla bark. The *Eau de Mantes*, a spirituous liquor, is made from *C. balsamiferum* of the W. Indies, and is used in irregular menstruation. *C. lacciferum* and *C. Draco* yield a resin used in varnish-making. Other aromatic, fragrant, and balsamic species are found in the W. Indies, the Cape of Good Hope, &c. The aromatic tonic Malambo bark, or Matias bark, is the produce of *C. Malambo*, and is used in Columbia as a remedy in diarrhœa, as a vermifuge, &c. See also COPALCHE BARK.

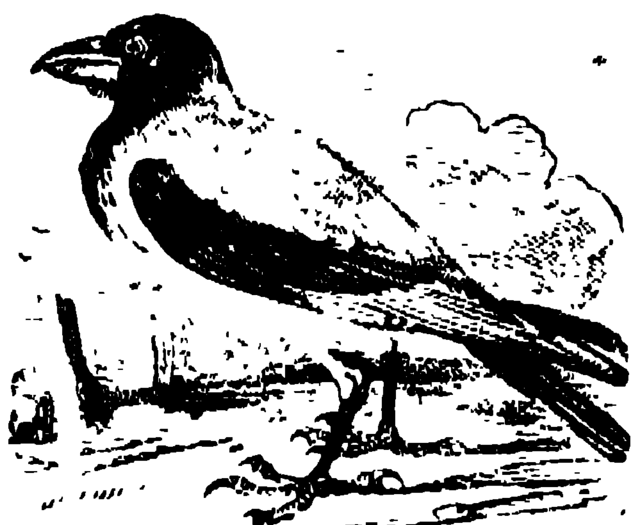
Croton Oil is expressed from the seeds of *Croton Tiglium* (see CROTON), is viscid, of a yellowish-brown colour, an acrid taste, and a nauseous odour. It is an exceedingly powerful purgative. Dose, one-third to one drop. Externally it is used as a liniment, one of C. O. to seven of olive oil, or some other oil, and produces pustules on the skin. It is good for counter-irritation, as in internal inflammations.

Crotoph'aga (Gr. 'tick-eaters'), a genus of Scansorial birds, known as the Anis or sub-family *Crotophaginæ*, the typical genus C. being confined to S. America, and possessing a much-com-

pressed bill, with the edge of the upper mandible sharply keeled. *C. ani*, or the Savannah blackbird, is a familiar species, and is found in the W. Indies, feeding on insects such as ticks, &c., which it picks out of the hides of horses or cattle.

Croup is an inflammatory affection of the windpipe, accompanied by the formation of a membranous exudation on the mucous surfaces attacked. The symptoms at first are those of a common cold, but they soon become alarming. The patient, generally in the night-time, awakens with a sense of suffocation—with a peculiar cough, called by physicians '*brassy*.' The breathing is quick, and there is a peculiar *crowing* noise as the air enters the lungs. There are occasional spasms of the muscles of the windpipe. C. is always worst during the night. The sufferer is very restless, and is frequently seen tearing at his mouth or throat as if to clear the windpipe of the obstruction causing impending suffocation. If relief be not obtained in the course of a day or two, death ensues from exhaustion, suffocation, or convulsions. C. is specially a disease of infancy, being most frequent during the second year. It is rare after five years of age, and is more common among boys than girls. It occurs chiefly in cold, damp climates, and is very fatal: one-half of those attacked die, and generally within two or three days. The proper treatment is to give emetics and purgatives at the outset, to apply hot sponges to the throat, to keep the child warm in bed, and to allow it to inhale moist warm air. In extreme cases Tracheotomy (q. v.) sometimes does good.

Crow (*Corvus*), a genus of Insessores belonging to the sub-order Conirostres (q. v.). The true crows, forming the sub-family *Corvinæ*, are known by their want of toothed processes at the tip of the upper mandible, the ridge of which is curved, by the long and rounded wings, by the scaly tarsi, and by the two lateral toes being of equal size. Of the British crows, the Raven (q. v.) (*Corvus corax*), the common carrion C. (*C. corone*), the rook (*C. frugilegus*), and jackdaw (*C. monedula*) are the best known. The Royston or hooded C. (*C. cornix*) is another species found in Britain. Variations in colour between these forms constitute the chief grounds of specific distinction. Other species of crows are the N. American C. (*C. Americanus*), the fishing C. (*C. ossifragus*) of the United States, the jabbering C. (*C. Jamaicensis*) of Jamaica, the smaller ebony C. of Ceylon, or Indian C. (*C. splendens*), &c. The Choughs (q. v.) are nearly related to the crows, but are usually included in a separate sub-family (*Pyrrhocoracinæ*). The Alpine C. (*Pyrrhocorax alpinus*) is one of the latter birds.


Hooded Crow

Crow'berry, or **Crake'berry** (*Empetrum*), a genus of dwarf, creeping, heath-like shrubs, belonging to the natural order *Empetraceæ*, found in high latitudes, and on high, bleak moorlands and mountains in Scotland, the N. of England, and similar parts of Europe and America. The name is, however, generally applied to *E. nigrum*—the black berries of which are eaten by game-birds and also by crows, who in regions where this berry is common leave the fields and resort to the hillsides to live on it till harvest-time: hence the name C. Its berries are eaten by the Highlanders, the Russian peasants, and by the Greenlanders mixed with train-oil. Boiled in alum, they yield a purple dye, and are used by the Laplanders for dyeing sable and otter skins black. *E. rubrum*, of the vicinity of Cape Horn, has edible red berries. The Portuguese Camarinheira (*Corema alba*) is closely allied to *Empetrum*, and is used in the preparation of an acidulous liquor used as a drink in fevers. By some authors it is described as *Empetrum lusitanicum*.

Crow'foot. See RANUNCULUS.

Crow'land, or **Croy'land**, an ancient town in the 'Fens' of Lincolnshire, 48 miles S.S.W. of Lincoln. It consists of four streets separated by watercourses with willows on their margin, and connected by a triangular bridge of three segments of a circle springing from three piers, but meeting in a point, across the Welland, the Nen, and a large drain called the Catwater. It is supposed to be as old as the time of Edward II. C. has also the ruins of an abbey said to have been founded in the 8th c. It was frequently destroyed and as frequently rebuilt, and part of it is still used as the parish church. Ingulphus was one of its abbots. Pop. (1871) 2459.

Crown, an ornament worn on the head as a symbol of regal or imperial station and dignity. In its derivation the modern C. comes from the *corona* which, among the ancient Greeks and Romans, was bestowed as an honorary reward to victors in athletics and public games; but in its real significance it represents the diadem or circlet which was worn by Oriental and early Roman kings. Crowns mentioned in Scripture were wreaths similar in nature and signification to the honorary crowns of the ancient Romans. Originally crowns were plaited or twisted of grass, leaves, twigs, flowers, or other inexpensive materials; but gradually they began, for certain purposes, to be made of precious metals and stones, and some of them were of very great value. Among the Romans, who bestowed crowns with a very lavish hand, the classes and varieties of such decorations were very numerous. Crowns of various descriptions and materials were conferred for distinguished conduct or service in military or naval undertakings; of which type the *corona triumphalis* may be noted as an example. This was bestowed on a victorious general to whom a public triumph was decreed, and consisted, first, of a wreath of laurel or bay leaves; second, a golden C., presented by the army which he had led to glory; and third, another C. of gold contributed by the various provinces. Emblematical crowns were worn by special classes, as, for example, the priests; and on particular occasions, such as funerals, weddings, and social festivities. The radiated C., which was originally reserved for deities and deified mortals, was adopted by several of the Roman emperors, Nero having been the first to use it as an imperial badge.

The crowns of monarchs at the present day are called *closed* crowns, because the diadem or circlet is overarched by a series of bands or arches, and the use of closed crowns is exclusively reserved to certain members of reigning houses. The first monarch who adopted the closed C. was Charlemagne, and his example was gradually followed by European rulers till the fashion became general. In England, the closed or arched C. was not introduced till the accession to the throne of Henry V., who had made for himself a simple C. with two arches. Since that period the royal C. of England has undergone many changes. That of Her Majesty Queen Victoria has two arches, which rise almost perpendicularly from behind the four crosses patées which heighten the circlet. Set alternately with the crosses are four fleurs-de-lys, and surmounting the whole at the intersection of the arches are a mound and a cross patée. The cap is of purple velvet lined with ermine, and the whole C. is richly studded with pearls, diamonds, and other precious stones. The crosses on the C. point to the title, 'Defender of the Faith,' and the fleurs-de-lys are relics of the English claim to the sovereignty of France. The state C. differs from the preceding mainly in superior richness. The famous iron C. of Lombardy, now preserved in the Imperial Schatzkammer at Vienna, was originally all gold, but in the 6th c. it was strengthened with a ring of iron made 'of a nail of the Cross,' whence it received its appellation. The signification of the triple C. or tiara of the Pope has been variously explained, but the commonly received interpretation is that it indicated the sovereign pontiff's threefold royalty—spiritual over souls, temporal over the states of the Church, and mixed over all kings. The Vatican treasury contains several tiaras which have been presented to the reigning Pope at various periods, the latest being one given to Pius IX. in 1855 by Queen Isabella of Spain, which weighs 3 lbs. and cost £12,000.

The Prince of Wales, as heir-apparent to the British throne, has a coronet closed with only one arch, surmounted with a mound and cross. Other members of the royal family, dukes, marquises, earls, viscounts, and barons, have open coronets, which are heightened for their various grades according to strict heraldic order. The charges of heraldry are mostly varieties and modifications of ancient crowns. See MITRE.

Crown Agent is the agent or solicitor in Scotland who, under the Lord Advocate, takes charge of criminal proceedings. The appointment lies with the Lord Advocate for the time, and is not held *ad vitam aut culpam*.

Crown Debts. By English law, debts due to the crown have a preference over all debts due to a subject. They are recoverable by a summary process, called an Extent (q. v.). In Scotland this rule only holds with regard to personal or movable property; and in a competition affecting heritage the crown has no privilege. The crown privilege is, however, good against the landlord's Hypothec (q. v.). It is also effectual against mercantile sequestration; consequently a discharge under the Scotch Bankruptcy Act is not effectual against a crown debt.

Crown Imperial. See FRITILLARY.

Crown Lands. Under various statutes all grants or leases exceeding thirty-one years of lands belonging to the crown are void. The superintendence of C. L. is now vested in the Commissioners of Woods, Forests, and Land Revenues (q. v.).

Crown Point, a fort famous in the French, Indian, and Revolutionary wars, stands on the W. side of Lake Champlain, and on the long narrow reach of the upper or southern end of the lake. Along with Ticonderoga, it guarded the pass of the great military route between New York and Montreal which nature has made by the Hudson River and Lake Champlain. It was taken from the English in 1775 by Ethan Allen, and is now a ruin. The village of C. P. is 100 miles N. of Albany. Pop. of township about 2500.

Crown Solicitor is the solicitor to the Treasury who in state prosecutions in England acts for the crown. In Ireland a C. S. is attached to each circuit. His duties are analogous to those of the Procurator-Fiscal (q. v.) and Crown Agent (q. v.) in Scotland. See PROSECUTOR, PROSECUTION.

Crow-Stone. See CORBIE STEPS.

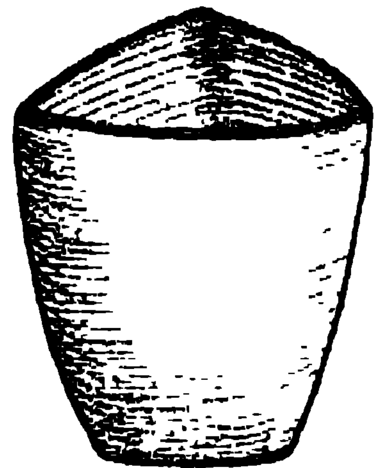
Croy'don (Fr. *Croie dune*, 'chalk hill,' from its situation on the edge of the Thames chalk basin), a town of Surrey, on the London and Brighton Railway, 10 miles S W. of Greenwich. There are several railway stations at C., of which the principal are the East, West, and New C. Its main street extends along the London and Brighton road for more than a mile and a quarter, and is flanked on both sides with respectable shops and several handsome buildings. The fine old parish church was entirely destroyed by fire in 1867, with the exception of the tower; but it has since been to a certain extent restored. It has several other good Gothic churches, a large new public hall, and numerous mansions and villas in the neighbourhood. The chief trade is in corn and butter. Two annual fairs are held—the one on July 5, the other on October 2. Pop. (1871) 55,652.

Crozet' Islands, an uninhabited volcanic group in the Indian Ocean, 385 miles S.W. by W. of the Cape of Good Hope. The western extremity of the largest (Possession Island) is in lat. 46° 22′ S. and long. 51° 30′ E. Area about 200 sq. miles.

Crozoph'ora, a genus of annual or perennial low-growing plants (natural order *Euphorbiaceæ*), found in tropical and Northern Africa, and extending as far as India. *C. tinctoria*, a native of the Mediterranean countries, is cultivated for the sake of the dye called *Turnsole*, which is obtained from it by grinding the plants (little herbs seldom more than a foot high) to a pulp in a mill, when they yield about half their weight of a dark-green juice, which becomes purple by exposure to the air or under the influence of ammonia. It is chiefly exported to Holland, and is prepared for exportation by soaking coarse linen rags or sacking with it, the rags being previously washed clean. After soaking they are allowed to dry, and are exposed to the influence of ammonia by being suspended over heaps of stable manure. They are then packed in sacks, and ready for shipping to Holland. Not much is known of the use the Dutch put the dye to, but it is supposed to be chiefly employed as a colouring matter for cheese, and perhaps confectionery, wine, &c. (Black in *Treas. of Botany*). It has been confounded with Litmus (q. v.).

Cru'cian or **German Carp** (*Cyprinus carassius*), a species of *Cyprinidæ* (q. v.) or Carps (q. v.), possessing no tentacles or *barbules* at the mouth, and a square tail. This fish inhabits lakes and rivers of N Europe and Asia. It has been found in the Thames. Its flesh is palatable.

Cru'cibles are vessels employed in fusing metals, glass, &c. They are made of refractory materials, and are generally of a conical shape. The substances used in their composition are various—platinum, fireclay, a mixture of graphite and fireclay (Plumbago C.), porcelain, iron, &c.


Crucible.

Cruciferæ, a natural order of Dicotyledonous herbaceous plants (rarely shrubs), belonging to the subdivision *Thalamifloræ*, so called because the four petals are placed in the form of a cross ('cross-bearing'). With the exception of a few plants of the natural order *Capparidaceæ*, this is the only order having *tetradynamous* stamens (*i.e.*, four long and two short). About 1730 species and over 205 genera, distributed chiefly in temperate climates, are known; a large number inhabit high latitudes, and a few are found in the tropics, chiefly on the side of mountains. *Cheiranthus* ('wallflower'), *Arabis*, *Hesperis* ('Dame's violet,' q. v.), *Capsella* ('shepherd's purse'), *Teesdalia*, &c., are examples. Antiscorbutic and pungent properties, frequently combined with acridity, characterise this order. The seeds generally contain a pungent fixed oil. Many of them contain sulphur, and the watercress contains iodine (Mulder). The order comprises many of our most common culinary vegetables, but not a single poisonous plant. All the plants popularly known as Cress (q. v.), Kale (see BRASSICA), Mustard (q. v), &c., belong to this order. Woad (*Isatis tinctoria*), which yields the blue dye with which it is said the ancient Britons stained their skins, and *I. indigotica*, used in China in place of indigo, wallflower, stock (*Matthiola*), candytuft (*Iberis*), honesty (*Lunaria biennis*), and other favourite garden flowers, are also members of this order. It has various subdivisions, according to the nature of the fruit and the way the embryo is folded.

Cru'cifix (Lat. *crux*, *crucis*, and *figo*, 'I fix') is a figure of Christ on the cross. It was several centuries till Christian art chose to represent Christ in this way as a suffering Saviour; its aim at first being to inspire faith more than pity, by reminding men of his having died for them, without reference to the agonies of his death. The earliest existing crucifixes are supposed to belong to the 9th c.; the first mention of them is perhaps in the writings of Gregory, Bishop of Tours (544-595). For the same reason, in some of the earliest Christ is represented as erect and robed, with no nails, wounds, or crown of thorns, and without any sign of pain. Besides the figure of Christ, there are also usually a number of minor figures on the C. The ends of the transverse beam of the cross are occupied with figures of the Virgin and St John, or of the sun and moon; at the upper end is the hand of the Father blessing Christ or holding a wreath; at the foot is the serpent and a skull; or the four ends are occupied by the attributes of the four Evangelists, &c. See *The History of Our Lord*, by Mrs Jameson and Lady Eastlake.

Cru'den, Alexander, to whose labours British divines are much indebted, was born at Aberdeen, 31st May 1700. He was educated at Marischal College in that city, and but for a tendency to insanity, would have entered the Church. In 1722 he went to London, where he was, in succession, a private tutor, a bookseller, and a corrector for the press. In 1737 appeared the work with which his name will always be associated, his *Complete Concordance of the Holy Scriptures of the Old and New Testament*, which stands still the first of its kind. Many editions have been published, that of Chalmers being still the most popular. C. was frequently deranged, and on one occasion he was confined in a private lunatic asylum, where, according to his own statements, he was harshly treated. His delusion that he was divinely commissioned to reform the people resulted in his taking to himself the title of 'Alexander the Corrector.' He was, however, a virtuous and benevolent man. C. died at Islington, November 1, 1770.

Cruik'shank, George, an eminent caricaturist, was born in London, September 27, 1792. His artistic powers showed themselves at an early age, and after the death of his father, who was a native of Aberdeenshire, he began to illustrate books for children. He subsequently illustrated two satirical publications, *The Scourge* and *The Meteor*, while his illustrations of the political squibs of the late William Hone attracted much attention. Turning to worthier and more ambitious work, he illus-

trated various books of fiction, including some by Dickens, such as *Oliver Twist*, and produced pieces like *The Bottle* (eight large plates), depicting the vice of intemperance, of which he was a vigorous assailant, being personally a total abstainer. He attained the highest success as an illustrator, and a position not unlike that held by Hogarth as a teacher of morality by means of satirical sketches. C. in his later years turned his attention to oil-painting. Among his best paintings are 'Tam o' Shanter,' 'Disturbing a Congregation' (painted for the late Prince Consort), and 'The Worship of Bacchus.' He died 1st February 1878. C. was a man of great physical vigour, and in his character artistic genius was seen in beautiful alliance with simplicity of heart and genuine benevolence.

Crui'ser (Dut. *kruisen*, 'to move crosswise,' from *kruis*, 'a cross'), a Government ship chiefly employed in watching an enemy or pirates.

Cruithne, Cruithneach (Lat. *Cruitheni*), the name given by Irish writers to that branch of the Celtic race which, at the dawn of history, inhabited both the N. of Ireland and the N. of Scotland, and which by the Latin chroniclers is denominated *Picti*. No satisfactory explanation of the meaning of the term has yet been given, and it is needless to refer to the various fables which bring the C. from distant countries—some of them to Ireland, thence to Scotland, while others reverse the process. But it deserves notice that almost all these accounts represent them as soldiers from a distance, who obtained wives from the Irish, and whose children consequently spoke the Irish language; and this probably represents the fact of their being intruders on some older branch of Celts, settling among them and intermarrying with them. It appears that as far back as history goes the C. possessed Ulster and a portion of Meath, while at the same time they held the whole N. of Scotland—then known as Alba, the name Scotia being applied to Ireland, or Erin. The *Pictish Chronicle*, written in the 11th c., says that Cruithne, the son of Cirge, had seven sons—Fib, Fidach, Fodla, Fortren, Cait, Ce, Circin—and that they divided Alba into seven portions. This means that the territory occupied by the C. consisted of seven provinces bearing the above names. Fib represents Fife; Fortren, the western parts of Perthshire; Fodla, Athole, written of old At-fodla; Circin, in old writings, Magh-circin, now Mearns; Cait, Caithness. The remaining two have not been hitherto identified; but Dalkeith, in Celtic, *Dail-Cé*, 'the portion or field of Cé,' may represent one of them, while Fidach must meantime be left landless. The Scots, another Celtic branch, encroached on the C. in Ireland, and in the beginning of the 6th c. established themselves in Argyleshire, eventually extending their sway over the whole kingdom, to which they gave their own name of Scotland; but, as the name *Picts* is much better known than that of C., the circumstances of this change of name and dynasty, as far as they can be known, will be given under that heading. The only thing necessary to state here is, that the common idea of the extinction of the Picts, or C., by the Scots, is altogether a fable. The King of the Scots, Kenneth M'Alpine, obtained in the 9th c. the throne of Northern Pictland (*Cruithnetuaith*) by inheritance. Through the aid of its inhabitants he subdued other portions of the kingdom, and united Scotland, as it finally came to be called, under one head. The C. or Picts represent the old Caledonians, who so long and so manfully resisted the Romans. A remnant of their descendants, it cannot be doubted, still occupy the ancestral mountains.

For a full account of the early history of Scotland see Skene's various writings on the subject, particularly his introduction to the *Chronicles of the Picts and Scots* and his *Celtic Scotland* (1st vol. Edinb. 1876), a work which entitles him to be regarded as the greatest authority on the Celtic antiquities of Scotland.

Cruive (perhaps connected with the Old Swed. *krubba*), the Scottish name for a trap, consisting of a sparred chamber or enclosure placed in a dike or dam across a river, for catching salmon. Last century cruives were common in the salmon-fishing rivers of Scotland. Their use in Great Britain is now illegal. See SALMON FISHING.

Cru'orine, the colouring matter of the blood. The name usually employed is Hæmoglobin (q. v.).

Cru'ra, a term used in anatomy to designate the roots or peduncles or supports of any structure. Thus we have the *C. cerebri*, or peduncles of the brain, the *C. cerebelli*, or peduncles of the cerebellum, the C. of the diaphragm, the C. of the *corpora cavernosa* of the penis, &c., &c.

Cruræ'us. The great muscle in front of the thigh, which extends the leg on the knee-joint, called the *quadriceps extensor*, is a large fleshy mass which covers the front and sides of the femur, and is usually divided by anatomists into four parts: (1) One occupying the middle of the thigh, the *rectus femoris*; (2) one portion occupying the outer side of the femur, *vastus externus*; (3) a third portion covering the inner aspect of the femur, *vastus internus*; and (4) the remainder covering the middle of the femur, between the two last named—the *C.*

Crusades' (Fr. *croisades*, from *croix*, Lat. *crux*, 'a cross') were the military expeditions of European nations during the 11th, 12th, and 13th centuries to vindicate the right of Christian pilgrimage to Jerusalem, and latterly to seize and hold Jerusalem against the Turks. From the capture of Jerusalem by Omar in A.D. 637 till the reign of Hakem, the third Fatimite Calif, the Christian inhabitants and pilgrims merely paid a tax to the Mohammedan governor—Harun al Rashid having delivered the city keys to Charlemagne. Hakem, however, persecuted the Christians, and mutilated the rock of the Sepulchre and the Church of the Resurrection. As the Catholic Church commuted penances for pilgrimages, many Europeans of all classes continued to encounter the risks of travel and persecution. This the excitement of the year 1000 favoured. After the capture of Jerusalem by the Turk Togul Beg in 1076, pilgrims were systematically plundered and insulted, but it was not till the Turks seriously threatened the Byzantine Empire that a crusade was formally proposed. Gregory VII. had seen in this only an opportunity for extending the Papal power, but Urban II. was roused by the French hermit, Peter of Picardy, into real enthusiasm, and at the general Council of Clermont (November 1095) invoked Western Europe to defend the Holy Land. *First Crusade.*—In March 1096 popular expeditions, without discipline or equipment, began to beg and plunder their way to Jerusalem. The first, led by a Burgundian, Gualtier *Sans-Avoir* (Walter the Pennyless), was destroyed in Bulgaria; the second, under Peter the Hermit, was cut to pieces on the plain of Nice by the forces of the Sultan of Rûm; the third, consisting of German peasants, led by a monk, Godeschal, perished before Belgrade through the treachery of the Hungarian king; the fourth, amounting probably to 200,000 persons, after massacring the Jews in Mainz and other episcopal cities, was exterminated by the Hungarian army. The military crusade of 1096 divided itself into four expeditions, organised by the nobles without the help of any monarch. The first division, from the Rhine and N. Germany, was led by Godfrey de Bouillon, Duc de Brabant, and his brothers Eustace and Baldwin; the second, from Central France, Normandy, and Britain, was led by Hugh, Comte de Vermandois, Stephen, Comte de Chartres, Robert, Duc de Normandy, Robert, Comte de Flanders, and Eustace, Comte de Boulogne; the third, from S. Italy, was led by Prince Bohemond of Taranto and his cousin Tancred; the fourth, consisting of Provençals, Spaniards, and Lombards, was led by Raymond, Comte de Toulouse, with whom was Adhemar, the Pope's legate. After collisions between these armies and the Greeks of the Eastern Empire, and much fighting and intriguing at Constantinople, the Emperor Alexius obtained an oath of fealty from a majority of the leaders, and added a small contingent to their forces. On 20th June 1097 the crusaders captured Nicæa, and at Dorylæum decisively defeated Solyman, Sultan of Rûm. While the main body crossed the Taurus, Tancred and Baldwin penetrated Cilicia. The unjust claim of the latter to the capture of Tarsus led to his desertion of the general crusade and his Armenian expedition, which resulted in the establishment of the principality of Edessa. The crusaders took Antioch, 3d June 1098, but were besieged there by a host of Persian Turks under Kerboga, whom they defeated mainly through the enthusiasm which the clever imposture of the Marseille priest, Peter Barthelemy, had excited. Bohemond became ruler of the new Christian principality of Antioch. Greatly reduced by famine and pestilence which visited them at Antioch, the army, led by Godfrey, Raymond, &c., in 1099 marched S. to Jerusalem, now in the hands of the Fatimite Calif of Egypt. In spite of the gallant defence of Istahar, the crusaders, after a siege of five weeks,

entered the Holy City, and massacred the Mussulman and Jewish inhabitants. On the 23d July 1099 the Latin kingdom of Jerusalem was founded, Godfrey of Bouillon becoming king under the title of Advocate or Defender of the Tomb of Christ. By Godfrey's victory at Ascalon (12th August 1099), by the energy of his successor, Baldwin I., in reducing Acre (1104), &c., and in founding the county of Tripoli (1109), and by reinforcements from Europe, the new kingdom was strengthened and extended. (See BOUILLON, GODFREY DE.)—*The Second Crusade*, provoked by the reconquest of Edessa by the Emir of Mosul in 1144, was preached by St Bernard (q. v.), under the auspices of Pope Eugenius III., and undertaken by Louis VII. of France and the Emperor Konrad III. After the German army had been almost entirely destroyed by the Sultan of Iconium, Louis, who had been detained at Constantinople by the treacherous Manuel, joined the Emperor, and both reached Antioch with a fragment of their original forces. An abortive attack on Damascus in 1149 was the only fruit of this crusade. The conquests of Noureddin, Sultan of Damascus, the blunders of the weak Almeric (who succeeded Baldwin III. at Jerusalem) in meddling with the affairs of Egypt, and the dissensions which the election of Guy de Lusignan as king excited, prepared the way for the sudden rise of Saladin, who crushed the Christian army at Tiberias in 1187, seized Jerusalem, put Antioch under tribute, but failed to reduce Tyre, which Konrad of Montferrat defended. This led to the *Third Crusade*, marked by the first imposition by European monarchs of the Saladine tithe on rents and movables. The siege of Acre began in 1189: in 1190 the Emperor Friedrich Barbarossa led his army to Cilicia, where he died; the Duke of Swabia proceeding to Acre, which was regained in 1191, on the arrival of Philippe Auguste and Richard Cœur de Lion. Philippe having returned home, Richard won the victory of Azotus, and captured Jaffa and Cæsarea; but when, in 1192, Jerusalem was reached, the crusade was suddenly abandoned, Saladin agreeing to leave the coast-fortresses in the hands of the Christians, and to give pilgrims free access to the Holy Sepulchre. This truce expiring, and the crusade proclaimed by Pope Celestin III. failing to place Almeric of Lusignan in possession of the Holy City, Pope Innocent III., seconded by the preaching of the French priest Foulques, set in motion the *Fourth Crusade* in 1200. Its leaders, the Marquis Boniface of Montferrat and the Comtes de Flanders and Blois, arranged for the transport of their troops by the Venetian fleet, and joined the Doge Dandolo in storming Zara, a city subject to Hungary. This having placed the crusaders in opposition to the wishes of the Pope, they agreed to espouse the cause of Alexius, son of the deposed Isaac Angelus, who promised that, if successful against his usurping uncle Alexius, he would unite the Eastern and Western Churches and assist the crusade. After the double siege of Constantinople (1203-5), which resulted first in the restoration of Isaac, next in the usurpation of Ducas Murzuphlos and the murder of Alexius, lastly in the coronation of Baldwin, Comte de Flanders, as first Latin Emperor of the East, and the division of the empire between Venice and the barons, nothing further was heard of this crusade. Montferrat obtained Macedonia and the republic of Venice, Crete and three eighths of the Asiatic provinces.—*The Fifth Crusade*, to assist Jean de Brienne, titular King of Jerusalem, against the Sultan Saphadin, who had succeeded to Saladin's power, was agreed to at the Lateran Council of 1216, called by Innocent III. The preliminary campaign of Louis of Hungary came to nothing, and although the Germans under the Duke of Austria, assisted by the French following of Comtes Nevers and La Marche, and the English under the Earl of Salisbury, in 1219 took Damietta after a siege of seventeen months, the folly of Cardinal Pelagius and the religious orders in declining the proffered cession of Jerusalem, led in 1229 to the disastrous advance on Cairo. In 1228 the Emperor Friedrich II. (q. v.) obtained a ten years' treaty, guaranteeing the occupation of Bethlehem, Nazareth, &c., and free access to the Holy City, where he was himself crowned despite the protest of the Patriarch. In 1238, the Christians having been driven out of Jerusalem, two distinct expeditions were organised, together known as the *Sixth Crusade*; the first, consisting of French knights led by Thibaud of Champagne and the Comte de Bretagne, was victorious at Ascalon, but routed at Gaza; the second, arranged at the Council of Northampton, was headed by Richard Earl of Cornwall, brother of Henry III., who in 1240 drew the courts of Damascus and Cairo into a treaty for the cession of Jerusalem and a large territory, and the release of Christian prisoners. The invasion of Palestine by the Kharizmian tribes, expelled from Persia by the Mongols, and assisted by the Sultan of Egypt, crushed the Latin state; and when the Kharizmians were expelled by the Syrians and Egyptians the Christians did not regain their rights. At the Council of Lyon (1245), accordingly, Pope Innocent IV. proclaimed a *Seventh Crusade*, in which Louis IX. of France, William Longsword of Salisbury, and others from France and England, set out from the rendezvous, Cyprus, in the year 1248. Egypt was the scene of battle. Damietta fell easily, but the Mameluke forces of Nejmeddin, the Sultan, checked the invaders at Mansura, cut off their communication with the sea, and destroyed the crusading army, taking Louis prisoner in 1250. Louis, after being ransomed, spent four years in fortifying the coast-fortresses of Palestine, and then withdrew to France. In 1265-68, Bondocdar, the Mameluke usurper, attacked Palestine, almost defenceless from the feuds of the military orders. The capture of Antioch after a series of victories led Clement IV. to proclaim the *Eighth Crusade*. This consisted of the fatal expedition of Louis IX. to Tunis (1270), and the energetic campaign of Prince Edward of England in the neighbourhood of Acre (then the capital) and Nazareth (1271-72), which forced from Bondocdar a ten years' peace. The reign of Hugues de Lusignan was marked by the reduction of Tripoli and Acre, and the final destruction of the kingdom of Jerusalem (1291). The Popes sought in vain to raise another crusade. Enthusiasm for the cross had been killed by the growing sense of failure, and by disgust with the selfish dealing of Rome. Many theories have been framed of the religious, political, and intellectual effects of the C. It would appear that aristocratic power was nowhere directly weakened by them, nor were the geographical outlines of religious and civil power altered. On the other hand, the C. extended the commerce of the maritime republics, who often obtained, for transporting troops, grants of streets and privileges of trade in towns they would not otherwise have reached so soon. To this increased importance of trade, and to the general enlargement of ideas which contact with new nations always begets, may be partly attributed the rise of municipal liberties, which marked the 12th and 13th centuries. The chief histories of the C. are those of Mills, Michaud, and Cox. Of the fourth and seventh C., contemporary accounts have been left by Villehardouin and Joinville. See also Heeren, *Sur l'Influence des Croisades*. A most interesting, original, and valuable contribution to one aspect of the C. seldom reflected on—viz., how were the financial arrangements for them carried through—has been made by M. Henri Lavoix of the *Bibliothèque Nationale* in his *Monnaies à Legendes Arabes frappées en Syrie par les Croisés* (Par. 1877).

Crusta'cea, a class of *Arthropoda* or *Higher Annulosa*, distinguished primarily by the fact that in its members the head and chest segments are united to form one piece, known as the *cephalothorax*. The breathing is conducted by *branchiæ* or *gills*, but may also be effected by the general surface of the body. Two pairs of antennæ exist. The limbs are more than eight in number, and are borne by the segments of the abdomen, as well as by those of the thorax. The name C. is derived from the general presence of an outer *crust* or skin of calcareous or horny matter, forming an *exoskeleton*, and represented by the 'shell' of the crab or lobster. A *Metamorphosis* (q. v.), or series of changes similar to that seen in insects, &c., occurs in those forms during their development from the young to the adult state. As in the Crabs (q. v.), the young appear first as free-swimming, tailed organisms named *Zoëæ*, and afterwards as *Megalopæ*; assuming the perfect or tailless form in the next stage. The lower C. may pass, in some cases, through a very complicated metamorphosis, as exemplified in Barnacles (q. v.), &c. In typical C. the body consists of twenty-one joints or segments—seven segments going to the head, chest, and abdomen respectively; and a general plan of structure or homology, as a rule, exists between the various segments of the body of a crustacean—such a homology being especially demonstrable in the Lobster (q. v.). These forms moult or cast their shells periodically; growth taking place in the body only when the body is soft and shell-less, and before the new shell is secreted. Reproduction of lost or injured limbs takes place in most C. The mouth is complicated, consisting of a series of jaws, which

in higher C. gradually merge into the type of feet. A stomach, liver, and intestine exist. The heart may be wanting, but when present it lies dorsally, and consists of a tubular contractile organ provided with valves. Blood-vessels exist in higher forms. The gills, when present, may be situated on the feet or enclosed within the body. The nervous system consists of a ganglionated chain of nerves lying vertically or on the floor of the body. The C. are divided and classified as follows. They inhabit both fresh and salt water, and some genera (*e.g.*, Brine Shrimps, q. v.) inhabit brine solutions :—

CLASS CRUSTACEA.

Sub-Class I.—EPIZOA.

Order 1. *Ichthyophthira*, Achtheres, &c.
,, 2. *Rhizocephala*, Lernæa, &c.

Sub-Class II.—CIRRIPEDIA.

Order 3. *Thoracica*, Balani, Barnacles, &c.
,, 4. *Abdominalia.*
,, 5. *Apoda.*

Sub-Class III.—ENTOMOSTRACA.

Order 6. *Ostracoda*, } Water-fleas.
,, 7. *Copepoda*, }
,, 8. *Cladocera*, }
,, 9. *Phyllopoda*, Brine-shrimps, &c.
,, 10. *Trilobita* (Extinct), Trilobites.
,, 11. *Merostomata*, King-crabs, &c.

Sub-Class IV.—MALACOSTRACA.

Order 12. *Læmodipoda*, Caprella, &c.
,, 13. *Isopoda*, Wood-lice.
,, 14. *Amphipoda*, Sandhoppers.
,, 15. *Stomapoda*, Locust-shrimps.
,, 16. *Decapoda*, Crabs, Lobsters, Shrimps, and Prawns.

Crus'ta Petro'sa, a substance found covering the fangs of human teeth, and forming layers in some examples of more complicated teeth, as those of the elephant or horse. It is identical in structure with bone, except that in C. P. we find no Haversian canals. See BONE, TEETH.

Crust of the Earth, the name given by geologists to that portion of our earth's surface accessible to human inquiry, and corresponding to the outer rind of our planet, into which, for several thousand feet, we have been able to penetrate. This 'C.' is made up of *rocks*, variously formed and arranged, and it is the province of geology to determine their relations, formation, and fossil contents.

Cru'ys, Corne'lis, a Dutch naval commander, born June 14, 1657, whom Peter the Great induced to join the Russian service. He superintended the making of dockyards, canals, and ships of war in Russia, which through his exertions first became a naval power. C. died in 1727.

Cry'ing, Physiol'ogy of. This is a modification of the ordinary movements of respiration excited by a mental emotion. Though excited by a contrary emotion, it is nearly related physiologically to the act of laughing. Frequently an individual may be between a 'laugh' and a 'cry.' In both, the muscles of expiration are convulsed, and the breath is sent out in a series of jerks through the open glottis. (See LARYNX.) C., unlike yawning, coughing, sneezing, never originates in the respiratory system, but is always an expression of an emotional state, though it must be confessed that in states of great general weakness, C. may sometimes occur without any very definite emotional antecedent.

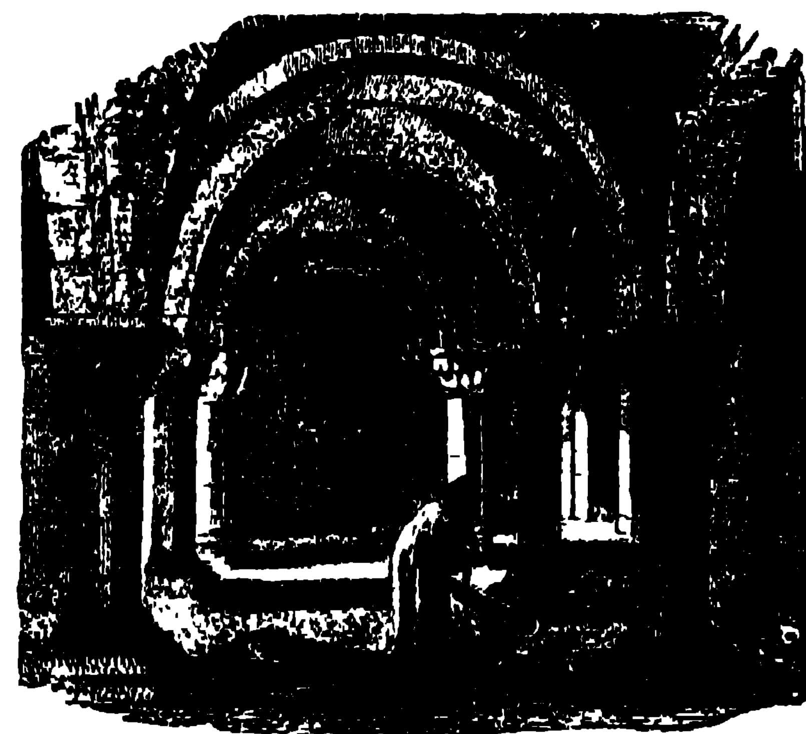
Cry'olite, a native fluoride of sodium and aluminum ($3NaF, AlF_3$), occurring in large deposits at Evigtok, Greenland, and also found in the Urals. It is a source of Aluminum (q. v.).

Cryoph'orus (Gr. *kryos*, 'cold;' *phero*, 'I carry'), a glass tube with a bulb at each end. The one bulb contains a little water, the other only water-vapour. When the latter is placed in a freezing liquid, the condensation of the vapour produces evaporation of the water, which, being accompanied by abstraction of heat, transforms the water into ice.

Crypsor'chis (from *krupto*, 'I conceal; *orchis*, 'a testicle'), a condition sometimes met with, in which the testicles have not descended from the abdominal cavity into the scrotum.

Crypt, a term used in anatomy to denote a pit or tubular depression in a mucous membrane. Thus there are the crypts of Lieberkühn, in the intestinal mucous membrane. See INTESTINE.

Crypt (Gr. *kruphe*, 'a covered place,' 'a vault,' from *kruptō*, 'I hide'), in ecclesiastical architecture, a hollow vault, partly or wholly underground, used as a church by the early Christians for safety during their services, and also as a place of sepulture. The largest C. does not generally extend beyond the limits of the choir or chancel and its aisles, and is often much smaller than these. It is carefully constructed and plainly finished. York Minster and Worcester and Rochester Cathedrals have each a C. older than the present building. That under Canterbury Cathedral is the finest and largest in England : there is also a fine C. under Glasgow Cathedral.


Crypt.

Cryptogam'ia, Cryptogams, or **Cryptogamous Plants** (Gr. *kryptos*, 'hidden,' and *gamē*, 'marriage'), the name applied to ferns, and their allies the horse-tails, club-mosses, and *Marsileaceæ*, mosses, liver-worts (*Hepaticæ*), lichens, fungi, *Characeæ*, and *Algæ*, which do not produce flowers like the phanerogamous or flowering plants, and accordingly have no seeds, and therefore no Cotyledons (q. v.) ; hence they are sometimes called *Acotyledonous Plants* (q. v.). They reproduce in various ways by *spores* or single cells without embryos. Many of the C. are parasitic, and the lower orders of them are entirely cellular ; hence they are sometimes called *Cellulares* (q. v.).

Cryptog'raphy (Gr. *kruptos*, 'secret,' and *graphein*, 'to write') is the art of communicating by signs or letters unintelligible except to the possessor of a key to the cryptograph. Various methods of C. were practised by the ancients. Thus Ovid recommends love-letters to be written in milk, and afterwards to be made legible by applying soot. C. was very generally used by diplomatists in the 17th c., and is still employed, especially in telegraphic despatches. One method of C. is to write with metallic solutions, the characters being afterwards disclosed by the action of certain gases, but more commonly a different sign or letter is used for each letter of the alphabet—a system of C. known as *chiffre*, *i.e.*, cipher. A cryptographic machine for transmitting secret correspondence was patented in 1860. In political diplomacy the art is less used than formerly.

Crystall'ine Lens, the principal refractive structure of the eye. See EYE.

Crystalline Rocks are highly metamorphosed rocks, in which the original texture has disappeared, and a new chemical arrangement, completely altering the mineralogical structure, has rendered the texture crystalline, and indistinguishable from that of igneous rocks. The chief of these are granite, syenite, diorite, and diallage rock ; and this connecting of the igneous with the true metamorphic, and so with the aqueous, seems to warrant the conclusion that all rocks forming the crust of the earth were at one time aqueous, and have been and are being transformed, through the agency of pressure and heat, into rocks metamorphic and igneous, which, gradually worn away by atmospheric and other causes, form new aqueous rocks, thus completing the cycle of geological operations.

Crystallog'raphy, the science which treats of crystalline forms and their classification. Most minerals assume, in virtue of their molecular constitution, a regular form, which is called a crystal—a form which is symmetrically arranged with respect to three or more definite axes. The most perfect crystals are obtained, not from natural minerals, but from the pure salt formed

artificially in the chemical laboratory. The usual method is by cooling or evaporating a saturated solution of the salt, by which means the crystals gradually separate out, the size depending chiefly upon the rate of evaporation. Fusion and slow cooling may be employed in many cases; for instance, in the case of sulphur and some metals; and very often substances such as iodine assume a crystalline form when passing directly from the gaseous to the solid state. Most crystals tend to split in particular directions, parallel to the axis of symmetry; and they very frequently have different co-efficients of elasticity, expansion, and conductivity along these different axes. Their optical properties also point out their structural character.

With regard to their classification, crystals are usually arranged in six classes or systems, which are as follows:—1. *The Monometric, Regular*, or *Cubic System*, which has three mutually rectangular and equal axes. The most important forms are the *cube, regular octohedron*, and *rhombic dodecahedron*, which are met with, under various modifications, among the metals, in common salt, the alums, fluor-spar, diamond, garnet, spinede, &c. 2. *The Dimetric, Square Prismatic*, or *Pyramidal System*, which has also three rectangular axes, two of which only are equal. These forms occur in zircon, apophylite, yellow potassium, ferrocyanide, &c. 3. *The Rhombohedral* or *Hexagonal System*, which has four axes, three of which are equal, co-planar, and inclined to each other at angles of 60°, while the fourth and principal axis is perpendicular to them all. The principal forms are the *regular six-sided prism*, the *rhombohedron*, the *scalenohedron*, and are met with in ice, calcspar, beryl, quartz, arsenic, antimony, &c. 4. *The Trimetric* or *Rhombic System*, which has three rectangular but unequal axes. The perspective forms of these crystals are very like those of the dimetric system. They are found in sulphur crystallised at a low temperature, nitrate and sulphate of potassium, sulphate of barium. 5. *The Monoclinic* or *Oblique Prismatic System*, which has three equal or unequal axes, two at right angles to each other, while the third is oblique to the one and perpendicular to the other. Such crystals are exemplified by sulphur crystallised by fusion and cooling, by realgar, sulphate, carbonate and phosphate of sodium, borax, &c. 6. *The Triclinic* or *Doubly Oblique Prismatic System*, which has three oblique equal or unequal axes, being therefore of great variety of form and exceedingly difficult of study. Such forms are assumed by sulphate of copper and nitrate of bismuth.

Crystals which grow by equal additions all round retain the original form; if the additions take place unequally, but still following some definite law, a new but connected form arises. Thus a cube, which increases except at the solid angles, will become in time an octohedron, the old angles being now the central points of the new planes. These planes are called the *secondary* planes, and the modifications thus produced from the *primary* form are termed *secondary* forms. Any standard treatise on mineralogy, such as Haüy's and Dana's, contains information sufficient for a practical understanding of the subject, which is also very interesting from a geometrical point of view.

Crystall'omancy, a once popular mode of divination by means of crystals, especially of the beryl. The diviner having in a low voice spoken the appropriate formulæ, handed the crystal to a youth or virgin, who read on it, or obtained by inquiry from spirits who appeared in it, what was desired to be known.

Csa'ba, a market-town in the county of Békés, Hungary, and till 1846 the largest village in Europe. It then purchased for 800,000 florins the right to hold markets of its own. It is also the largest Protestant community in Hungary. C. has a trade in cattle, grain, hemp, and wine. Pop. 32,000.

Csanad' Palo'ta, the name of a town in Hungary, on the Maros, with a pop. (1869) of 4013. It became the seat of a bishop in 1096.

Cso'ma de Körös, Alexander (properly *Körösi Csoma Sandor*), a Hungarian traveller and orientalist, born at Körös (Transylvania) in 1790—according to some in 1798—was carefully educated, and devoted himself to philosophical studies at the college of Nagy-Enyed from 1812 to 1815, after which he studied Oriental languages in Germany. The dream of his youth had been to travel in Central Asia, and discover, if possible, the original seat of the Hungarian race. With this object he assiduously studied geography, ethnology, philology, and history at Göttingen, and afterwards at Temesvar, Agram, and Bucharest.

In 1820 he travelled through Bulg... Rumili to the port of Enos, where he shipped for Egypt... out of Alexandria by the plague, he set out on his tra... the East, passed by Aleppo and Mosul to Bagdad, and th... sisted by the English consul, proceeded by Kermanshah a... nadan to Teheran, where he arrived in October 1820. Here ... ined four months, studying the Persian language. In March ... disguised as an Armenian, set out from Teheran, and afte... dventures and hardships, arrived on the 18th November ... whence, joining a caravan, he travelled by Cabul an... Pass to Lahore in the Punjab. He subsequently ... travelling in Cashmere and Ladakh, making hi... with the Thibetan tongue. The study of this lang... almost unknown in Europe, although its literature ... attention, engaged C. for several years, first with the Lame Tsanskar, and afterwards in the Lamaist convent of Kanum ... the Upper Sutlej. After mastering the language, C. repai... to Calcutta, where his labours and accomplishments met w... a cordial acknowledgment from the Asiatic Society, who ... pointed him their librarian. While thus engaged he produc... his two great works, *A Grammar of the Thibetan Language* a... *An Essay towards a Dictionary, Thibetan and English*, both ... which were published at Calcutta (1834) at the cost of t... British Government. For the *Asiatic Researches* (vol. xx.) ... also wrote a synopsis of the holy books of Lamaism. In furth... prosecution of his researches he resolved to visit Lhassa, th... capital of Thibet; but while on the route he was seized wit... illness, and died at Darjeeling, in Sikkim, 11th April 1842. If C. failed to discover in Thibetan the origin of his native Magyar, he at least merits the credit of having been the first to bring that language and its literature within the scope of European scholarship. See a most interesting autobiographic ... read before the Royal Asiatic Society, Calcutta, ... 1834, and printed in vol. i. of the *Journal* of that Soc...

Csongrad', a market-town of Hungary, on a tongue ... opposite the mouth of the Körös, 35 miles N. of Sze... has a trade in cattle, timber, and tobacco. Pop. 17,...

Ctenoi'dei, or **Ctenoid' Fishes**, the name pr... Agassiz, not generally used in zoology, to indicate ... as the flounders, perches, &c., in which the scales ... hinder margins divided into 'comb-like' structures, ... spines so as to resemble combs. New spines appear ... loped with the growth of the scales.

Ctenoph'ora, the highest order of the class *Actino*... sented by delicate, free-swimming organisms, such ... (*Beroë*), &c., and distinguished by possessing *ctenophores*, ... rows of *Cilia* (q. v.) (vibratile filaments), arranged in ... plates. No coral structure is developed in these organis... are eight bands of ctenophores, arranged meridionally, ... a familiar member of the group, which may be found ... floating on the sea in the form of a clear, jelly-like b... shape. The mouth is at the oral or lower pole of th... a stomach and complex system of canals exists, ... presenting a circulatory system. A *ctenocyst* exists ... or upper pole of the body; this latter, consisting o... or sac, containing fluid and limy particles, and ... nerve filaments from a ... nervous mass. Th... body. definite appearance of a ... we proceed upwards. ... of the C., is a long ban... at night shines in the se...

Ctesib'... flourished ... that seen in ... invention ... lopment from ... and for u... (q.v.), the ... elasticity o... named ...

Ctes'iph... eastern bank ... of Seleucia, ... The site of C... 'the two citi...

Cuba, '... portance ... island of ...

...in the 3d c. B.C. He is famous for his ... such as the pump, the water-clock, the ... along with his pupil Hero ... Alexandr... the air as a motive power. ... ion, a city in the southern part of Assyria, ... of the Tigris. It rose into importance on the ... was the winter residence of the Parthian ki... has been identified with the modern Al Mada...

...Pearl of the Antilles,' and the one colony of im... belonging to Spain, is the largest and wealthiest ... W. Indies, and is situated between the Mexican ...

...est or ... plicated, con...

Gulf on the W., the Caribbean Sea on the S., and the Nicolas and Old Bahama Channels on the N. It is about 150 miles distant from the two great peninsulas of Florida and Yucatan. It is 740 miles long, 70 miles in average breadth, extends from E. to W. lat. 19° 43′–23° 12′ N., long. 74° 5′–85° W. Area, 42,020 sq. miles; pop. (1876) 1,400,000. The island is divided into three *intendencias*—the western, pop. (1872) 1,034,616, capital Havana; the central, pop. 75,725, capital Puerto Principe; and the eastern, pop. 249,096, capital Santiago de C. The coast, which is encircled by sandbanks, coral reefs, and small islands, is for the most part low, and broken by inlets which form excellent harbours. Havana, the key to the Mexican Gulf, is one of the finest harbours in the world; along the northern coast, at Matanzas, Nuevitas, Nipe, and on the southern coast, at Cienfuegos, Santiago, Guantanamo, and other spots, there are also fine natural harbours.

The island is traversed in the direction of its length by a range of hills, comparatively low in the W., but gradually rising towards the E. Above Trinidad, on the S. coast, the rugged mountain masses are not without grandeur, while the rare beauty of the coast and inland scenery is unsurpassed by that of the most renowned of the Mediterranean lands. The western department, which is the smallest, is for the most part level, and contains almost all the great sugar factories and tobacco plantations, which constitute the enormous wealth of the island. In the central department the population is massed in the capital and in a few small towns; the rural districts are chiefly forests and unpeopled savannahs. The eastern department, where the first colonists settled, was previously well cultivated in certain districts. Much of the interior, however, was left in a state of nature, and many tracts are still described as 'waste.' The soil is so fertile that when neglected for a short time it becomes rapidly overrun with vegetation. The principal productions are sugar, tobacco, coffee, rice, and cotton. The sugar cultivation is the most profitable; the tobacco and coffee culture has within recent years been much neglected. Many of the most flourishing coffee plantations have been converted into sugar estates. Since the civil war and the abolition of slave-labour in America, that country, which previously grew its own sugar, has become dependent upon C. for that article. Of the whole amount of sugar annually produced in C., 75 per cent. is exported to the United States, and only 15 per cent. to Spain. The value of the sugar exported in 1872 was over £20,000,000. Large quantities of honey, rum, wax, tobacco, and cigars are also exported from Havana. The imports of C. consist principally of rice, olive oil, flour, jerked beef, shooks (boards and staves for hogsheads and sugar-boxes), lard, and coals. Over 1000 miles of railway are in operation in the W. division.

History.—C. was discovered by Columbus, 28th October 1492, and was occupied by the Spaniards under Diego Velasquez in 1511. The native Indians were rooted out about 1560. In 1584 Havana was fortified, and in 1777 the government of the island was reconstituted under a Captain-General. From 1773 Havana continued to be the centre of the slave-trade of the whole of Spanish America. The island suffered from insurrections of the slaves in 1844 and 1848. Though nominally abolished by law, slavery is still a firmly-rooted institution. For this and for other reasons the conquest or purchase of the island has engaged attention within recent years in America. Lopez [illegible]ed on the island at the head of an American filibustering [illegible]dition in 1851, but was captured and executed. In 1868 [illegible] out the insurrection which still continues to smoulder. [illegible] movement had its origin in the hostile relations and con[illegible] interests of the two great classes of the free popula[illegible] the Peninsulars or Spanish immigrants, and the Creoles or [illegible] Cubans. The Peninsulars maintain a volunteer force of [illegible] men throughout the island, and practically overrule the [illegible]n-General and the authorities. The Cubans are anxious [illegible] abolition of slavery; the Peninsulars, embracing all the [illegible] sugar-planters, are determined to maintain slavery by force. [illegible]870 the Moreb law was promulgated, declaring every slave [illegible] on reaching the age of sixty, and decreeing the liberty of [illegible]ll children of slaves born after that date. This law, which has hitherto remained a dead letter, has done much morally to strengthen the position of the insurgent Cubans. It is estimated that from 1868 to 1873 the struggle in C. has cost 150,000 lives. See the works of A. Gallenga (Lond. 1873) and Townshend (Lond. 1875).

Cubag'ua, an island between Venezuela and Margarita, in the Caribbean Sea. It is about 9 miles long, and has considerable pearl-fisheries. C. was discovered by Columbus in 1498.

Cube, a solid, all of whose six sides are squares, which are necessarily all equal. The volume is found by multiplying the area of the base by the height, *i.e.*, by multiplying the edge twice in succession by itself. Hence we have the expression *to C.* a given number, the C. of a being $a \times a \times a = a^3$. To extract the C.-root of a number is to find that number which when cubed will produce the original number. The C.-root of a^3 is a.

Cu'bebs, or **Cubeb Pepper**, the fruit of *Piper Cubeba* (*Cubeba officinalis* of other botanists), a climbing shrub of Java and other Indian islands, belonging to the *Piperaceæ*. C. are about the size of black pepper, globular, wrinkled, and supported on a stalk. They have a peculiar odour and a warm taste like that of Camphor (q. v.). C. are distinguished from pepper by their lighter colour and the stalks—hence often called 'stalked pepper.' They contain a volatile oil (oil of C.), $C_{15}H_{24}$, constituting about 10 per cent. of C.; also a *resin* and a crystalline principle, *cubebin*, very analogous to *piperin*, found in pepper. C. are used in medicine to arrest mucous discharges, especially those of the Urethra (q. v.). African C. is the fruit of *Piper Clusii*.

Cub'ic Equation, an equation involving the cube of the unknown quantity with either, neither, or both of the lower powers. The most general form can be reduced to the form $x^3 + ax + b = 0$; but the further reduction by Cardan's rule, given in all the more advanced text-books of algebra, evolves a result which is the sum of two impossible quantities, except when two of the roots are impossible or equal. Accordingly, when the three roots are possible and different, ordinary algebraic methods fail, and recourse must be had to trigonometry for the general solution; but in this instance the roots are usually easily obtained by mere inspection. For details the reader is referred to Todhunter's *Theory of Equations.*

Cu'bical Nitre, or **Chili Saltpetre**, is the nitrate of soda ($NaNO_3$), and is imported in large quantities from Chili and Peru, as a manure, and for the manufacture of gunpowder and nitric acid. See SODIUM.

Cu'bit (Lat. *cubitus*), an ancient linear measure, being the length of the arm from the elbow to the tip of the middle finger. The Hebrew C. has been variously estimated from 19 to 22 inches; the Roman C. was about 17½ inches, but it is generally taken as equivalent to a foot and a half.

Cu'boid Bone, one of the bones forming the arch of the foot. It is placed on the outer side of the foot, in front of the *os calcis*, and behind the fourth and fifth metatarsal bones. Its name indicates its shape. See FOOT, TARSUS.

Cuck'ing-Stool. See DUCKING-STOOL.

Cuck'oo (*Cuculus*), a genus of Scansorial birds, of the family *Cuculidæ*, distinguished by the compressed bill, by the ridge of the arched upper mandible, by the membranous nostrils, by the long and pointed wings, and by the short tarsi, which are partly clothed with feathers. The outer toe can be directed backwards or forwards at will. These birds inhabit the Old World exclusively, and their name is derived from their song-note. The common C. (*Cuculus canorus*) averages a small pigeon in size. It is of a greyish colour, the breast being marked with brownish-black, and the tail black. It is migratory, arriving in Britain in April, and flying southwards in July. The food consists of insects. It has the habit of laying its eggs in the nests of other birds, so that its young may be, as it were, hatched by foster-parents. The *Coccystes Glandarius*, or Great Spotted C., inhabits S. Europe and Africa.


Cuckoo.

Cuculla'ris, an old term, still sometimes used, to denote the *trapezius muscle*. See TRAPEZIUS.

Cu'cumber (*Cucumis sativus*), a tender annual, with rough trailing stems, a native of Asia and Egypt. It was cultivated in England as early as 1327, but it is only since Henry VIII.'s reign that it has become a common table-vegetable. Though accounted by some cold and unwholesome, it is now much used as a salad, or when young (*gherkins*) as pickles; and the village of Sandby in Bedfordshire is said to sometimes furnish in one week 10,000 bushels for the London market for pickling. In the N. a hotbed is required for its growth, but in southern Britain and equally warm localities it is grown in the open air. The Indian C. is *Medeola virginica*. In America the term *one-seeded star C.* is applied to *Sicyos;* snake C. is *Trichosanthes colubrina* and *Cucumis flexuosus;* squirting or spirting C., *Ecbalium agreste* (*Momordica Elaterium*). See ELATERIUM.

Cucurbita'ceæ—the Gourd or Cucumber order—a natural order of Calycifloral Dicotyledonous herbaceous plants, climbers in which tendrils take the place of stipules, chiefly natives of hot countries, and specially of the E. Indies and S. America, though some are found in the N. of Europe, N. America, the Cape of Good Hope, and Australia. *Bryonia dioica*, a violent emetic and purgative, sold by the herbalists under the name of White Bryony Mandrake (q. v.), is the only British species of the order. About 350 species, distributed over seventy genera, are known. *Citrullus Colocynthis* is Colocynth (q. v.). The various species of Gourd (q. v.), Melon (q. v.), squirting cucumber (see ELATERIUM), pumpkin, squash, vegetable marrow, &c., belong to this order. In addition to the use of *B. dioica* already given, the root is employed as an external application to bruises, and the young shoots are eaten as a substitute for asparagus. The roots of *Momordica dioica* and *Bryonia umbellata* (of the E. Indies) contain starch, and are used as food. The seeds of *Telfairia pedata*, an African plant, and other species, are eaten like almonds, and yield oil by expression. The order is divided into three subdivisions, viz.—(1) *Nhandirobeæ*, (2) *Cucurbiteæ*, and (3) *Sicyeæ*.

Cud'bear, a purple dyeing substance prepared from various lichens, but chiefly from *Lecanora tartarea*, by a process similar to that for making *archil*, from which C. only differs by being prepared in the form of a dry powder. The manufacture was commenced by a Mr Mackintosh and Dr Cuthbert Gordon at Leith about 1777, and the name of the dye is a corruption of *Cuthbert*. Formerly the collection of lichens, called *crottals*, for the preparation of C. was an important industry in the Highlands of Scotland, but the supply now comes from Sweden, Norway, &c., and, except for domestic dyeing, no lichens are now collected in the Scotch Highlands. C., as a dye, imparts a brilliant bloom, but of itself is fugitive, and is therefore never so employed.

Cuddalore' (*Kŭdalūr*, 'the town at the meeting of the waters'), the chief town in the district of S. Arcot, Madras, British India, 127 miles by rail S. of Madras city. The harbour has now silted up, and admits only native craft, but large ships can anchor in the roads. Pop. (1871) 40,464. Large quantities of grain, indigo, oils, and sugar are sent by rail to Madras. During the latter half of the 18th c. it was a place of great strength and importance, and on the capture of Madras its factories were transferred thither. It was taken by the French in 1758, recovered by the British in 1760, retaken by the French in 1782, and finally ceded to England in 1783.

Cudd'apah (*Kadapa*, a 'gate' or 'mercy'), a town in the province of Madras, near the right bank of the Upper Pennaur, 80 miles W. of Nellore, on the Bombay and Madras Railway. The military cantonment, with ample accommodation for European and native troops, is the principal feature. The former palace of the nabobs is now a courthouse and prison. The diamond mines of C., about 7 miles from the town, are celebrated. Pop. (1871) 16,275.—The *district* of C., with an area of 8377 sq. miles, contains 1,354,194 inhabitants. The chief crops are rice, grains, cotton, indigo, and sugar-cane. The weaving of cloth is an important industry.

Cudd'y (Dut. *kajuit*, Fr. *cahute*, 'a hut, a ship's cabin'), in small vessels, the cabin where the men's rations are cooked.

Cudra'nia, a genus of climbing spiny shrubs of the natural order *Artocarpaceæ*, natives of the Moluccas, Philippines, India, and tropical E. Africa. The heartwood of an E. African species yields a light-yellow dye.

Cud'weed, a popular name for various plants of the genera of *Gnaphalium*, *Filago*, and *Antennaria*, belonging to the natural order *Compositæ*, which, from the heads of the flowers being chiefly composed of involucral scales, preserve an apparently unchanged condition, so that they are generally known as Everlasting Plants (q. v.). *A dioica* (catsfoot) was at one time employed in chest-diseases. The golden C. is *Pterocaulon virgatum*.

Cud'worth, Ralph, D.D., an eminent divine and philosopher, was the son of the rector of Aller, in Somersetshire, where he was born in 1617. He was educated at Cambridge, where he became a tutor, held the livings of N. Cadbury and Ashton, the Regius Professorship of Hebrew, and the masterships of Clare Hall and Christ's College, and was a prebend of Gloucester. He died at Cambridge, June 26, 1688. C.'s *chef d'œuvre* is *The True Intellectual System of the Universe*, published in 1678 (new ed. 4 vols. by Birch, 1830), in which he defended revealed religion against materialists and atheists, and maintained the doctrine of a rational system of knowledge founded on innate ideas. His philosophy may be considered as a system of Christian Platonism. C.'s work brought him much fame, and, on account of the fulness with which he stated the views of opponents, not a little odium. He left behind him various MSS., which are now in the British Museum. One of these, a *Treatise concerning Eternal and Immutable Morality*, published in 1731, was intended to form the second part of his *Intellectual System*. Principal Tulloch's work on *The Rational Philosophers and Philosophy* (1874) of the 17th c. contains a lucid criticism on C.'s position and mode of thought.

Cuen'ça (Lat. *concha*, 'a shell,' so called from its form), a fine old city of Spain, in the province of Castilla la Nueva, romantically situated amid a girdle of hills at the height of 3400 feet above sea-level, about 90 miles E. by S. of Madrid. It has fifteen churches, twelve convents, and a fine Gothic cathedral, is the see of a bishop, and was once celebrated in arts, literature, and manufactures. Pop. 7600. The bridge and convent of San Paolo are interesting. C. was thrice sacked by the French in 1808, 1810, and 1811.

Cuença, the capital of the province of the same name in the republic of Ecuador, S. America, lies on a plateau 8640 feet above the level of the sea, is a bishop's see, and has extensive sugar-refineries, with a trade in grain and Peruvian bark. Pop. 20,000.—The *province* of C. has an area of 11,308 sq. miles, and a pop. of 171,300. It produces sugar, cotton, and cochineal, and has gold, silver, copper, and sulphur mines.

Cue'va de Vera. See VERA.

Cuirass' (Fr. *cuir*, 'leather,' from Lat. *corium*, 'a hide'), a piece of plate-armour, which covered both breast and back, from the neck to the girdle. It consisted of breastplate and backplate, which were fastened to each other by straps, hooks, or buckles. The earliest C. was made of leather, or quilted linen or cloth, so thick as to be proof against pistol or musket shot. The C. was used by the Greeks and Romans, became common in Europe about the middle of the 14th c., and was discontinued in England after the reign of Charles II.; in France a little later.

Cuirassiers, heavy cavalry wearing the cuirass which Napoleon I. reintroduced after it had been for about a century disused, and his regiments of C. were prominent in his wars. C. still form a portion of the French cavalry. Germany, Austria, and Russia have also regiments of C. Great Britain has no regiment so named, but the Household Brigade—that is, the Life-Guards and Royal Horse-Guards or 'Blues'—wear a cuirass.

Cuissarts', or **Cuissots'** (Fr. *cuisse*, 'the thigh'), thighpieces in plate-armour, made of small strips of metal riveted over each other.

Cuja'cius, the Latinised surname of **Jacques Cujas**, originally **Cujaus**, a distinguished French jurist, born at Toulouse in 1522. He became Professor of Law successively at Bourges and Valence, and died at Bourges, 4th October 1590. C. applied himself to the study of Roman law, and completed what

Alciat had begun, viz., he restored the body of Roman jurisprudence to its historical sincerity, and is the true founder of the historical school of Roman law, since further developed in Germany. Of the numerous writings of C., the excellent edition of Fabrot (10 vols. fol. Par. 1658–59; new ed. by Prato, 1859, *et seq.*) merits notice for having a chronological table of the several works. See Spangenberg's *C. und seine Zeitgenossen* (Leips. 1822).

Cul'dees, or Kyl'dees. Among many others, the following derivations of this name have been suggested:—*Cêle-dé*, 'servant of God' (*cêle* appearing in modern Celtic as *gilly*); *Cultores Dei* ('worshippers of God'), abbreviated; *kill*, 'a cell.' The name is applied to a class of ecclesiastics who appeared in Scotland and Ireland about the middle of the 9th c., but who are merged in the general Church after the close of the 12th c. They did not belong to any of the great regular orders, nor were they secular priests, nor did their often wealthy communities follow any invariable monastic rule. Some indeed were hermits, but most of them conventuals, among whom marriage was not forbidden and poverty not enjoined. Their history shows that at the time the Scottish C. were neither nationally organised nor habitually subject to Rome; they were not governed by the bishops of the seculars, but they had their grades of office; the *scoloch*, or scholar, who assisted in the services, being the lowest. On baptism, one became a brother or sister; on ordination (which included tonsure of the fore part of the head), one became a presbyter. They had also deacons, who superintended works of charity, and *præpositi*, or teachers of schools. New settlements (*cœnobia*) were founded by a chief presbyter, or *abbas*, and twelve *socii*. The church (*oratorium*) was of plain wood with a stone belfry. Families of catechumens probably gathered round such institutions; land was cultivated, malt-kilns and meal-mills were built, and a spiritual territory was formed, over which the *abbas*, or an *episcopus*, presided. It was at one time thought that the early Church of Columba and the Culdee communities were historically continuous, subordination to Rome being introduced for the first time by the Saint-Queen Margaret and her sons. The lands of the C. were not exempt from the gradual secularisation which overtook the more important pious gifts, the 'abbot' and the 'parson' frequently being laymen. In the Catholic revival (1107-24) many fraternities became canons-regular of the Augustine rule. At St Andrews, Lochleven, and Dunkeld, the regular canons and the remaining *keledei* (a prior and twelve brethren who performed service, had official residences, and drew the minor dues) lived for some time alongside each other. But gradually, as the parochial and cathedral system was developed, the earlier institutions were absorbed by cathedral-chapter or parish church, and occasional traces of their existence are not found later than the 14th c. In some cases the C. handed over everything, retaining life-interests; in others, the transfer was confined to parochial fees and oblations, the tithes being preserved entire, along with the right to vote in the election of the bishop. Even where the name is lost, the corporation is found subsisting in the form of ten prebendaries governed by a provost. Monymusk (Aberdeenshire), Brechin, Lismore, Dornoch, and Dunblane are also known as the sites of Culdee communities in Scotland. In Ireland the C. also appeared about the 9th c. In Dublin, Armagh, and other places, they seem, as colleges of seculars performing certain functions in the cathedrals, to have maintained a distinct existence much longer than in Scotland. In England and Wales, although the name of *cultores clerici* occurs, and the name of Culdees is once used by Giraldus Cambrensis as equivalent to *cœlebes* ('bachelors'), there is no trace of the Scotch institutions. They have been likened to the minsters, or colleges of missionaries in S.W. England; also to the Austin Canons, and to the followers of St Chrodogang of Metz. See Walcott's *Ancient Church in Scotland;* Burton's *Hist. of Scotland;* Reeves' *C.; Proceedings of the Royal Irish Academy*, 1860; Grub's *Ecclesiastical History of Scotland* (Aberdeen, 1861).

Cul-de-sac, a term used in anatomy to denote a pouch formed by the infolding of a membrane. Thus we have the *cul-de-sac* of the pleura, or the pouch formed by the membrane projecting into the root of the neck, so as to cover the apex of the lung in that region.

Cu'lenborg. See KUILENBURG.

Culiacan', the capital of the Mexican state Sinaloa, on the river C., which flows into the Gulf of California, a little to the S. of the 25th parallel of N. lat. It was founded in 1532. Estimated pop. (1868) 10,000.

Culil'awan Bark. See CLOVE BARK.

Cull'en, a coast-town and royal burgh of Banffshire, Scotland, 11 miles W. by N. of Banff, at the mouth of the C. Burn. It has some linen manufactures and distilleries, and important cod, salmon, ling, and herring fisheries. Pop. of town (1871) 2056. Cullen House, in the vicinity, is the seat of the Earl of Seafield.

Cull'en, William, a celebrated Scottish physician, was born at Hamilton, in Lanarkshire, 15th April 1710. He studied at the grammar-school of Hamilton, and was then apprentice to a surgeon in Glasgow, where he attended some of the classes in the university. In 1729 he was appointed surgeon in a W. India merchantman, and after having made several voyages, he settled in the parish of Shotts, where he was introduced to the Duke of Argyle. Leaving Shotts, he studied medicine for two winters at Edinburgh, and in 1736 commenced to practise at Hamilton. Here he secured the friendship and patronage of the Duke of Hamilton, and became acquainted with William Hunter, the anatomist. In 1740 he graduated as M.D. at Glasgow, where he lived after the death of the Duke of Hamilton, and where in 1746 he delivered a course of lectures on the theory and practice of medicine in the university. Next year he added a course on botany and materia medica, and in the session following a course on chemistry, 'directed chiefly to the improvement of arts and manufactures.' This seems to have been the practical foundation of the medical school of Glasgow. The celebrated Dr Black (q. v.) was one of his pupils in chemistry, and by directing his attention to the doctrine of heat, and employing him as his assistant in his experiments, C. contributed to his future fame. On the 2d January 1751, C. was made Professor of Medicine in the University of Glasgow, by the influence of the Duke of Argyle, at the instance of Henry Home, afterwards Lord Kames, who further influenced the Duke to have C. appointed Professor of Chemistry in Edinburgh University, in room of Dr Plummer. He began to lecture there, not without opposition from the senatus, in January 1756, and was formally elected professor in July following. In 1757 he delivered a course of clinical lectures in the Royal Infirmary; in January 1761 he began a course on materia medica; on November 1, 1766, he was appointed Professor of the Institutes of Medicine, his old pupil, Dr Black, succeeding him in the chair of Chemistry; and in 1773 he succeeded Dr Gregory in the chair of the Practice of Physic. For many years before his death, on the 5th February 1790, he alternated the duties of his chair with those of a practical agriculturist, having in 1778 purchased a small estate near Edinburgh. C. was an original investigator and eloquent expounder of medical science. He delivered his lectures *viva voce*, with only a few notes to guide him, and discouraged, amongst his students, the use of text-books, previously in use. He combated the doctrines of Boerhaave, then currently accepted, and encouraged independent investigation. By his originality and enthusiasm he gave an impetus to medical science in the Scottish universities, and his nosological method still forms the groundwork of the classification of disease. His chief works are *First Lines of the Practice of Physic* (Edinb. 1775); *Synopsis Nosologiæ Methodicæ* (1785); a *Treatise of the Materia Medica* (1789). His collected works were published at Edinburgh in 1827 in 2 vols. by Dr John Thomson. See *Life of C.*, commenced by Dr Thomson in 1832, and finished by Dr Craigie in 1859.

Culle'ra, a town of Spain, in the province of Valencia, about 2 miles from the mouth of the Jucar, on its left bank, and about 23 miles S.S.E. of the city of Valencia. It is fortified, has an old castle and extensive barracks. The industries of the neighbourhood are farming, fishing, vine-culture, and the production of wine and oil. There is a considerable trade in cattle, and a busy coasting trade, extending to France. Pop. about 10,000.

Cullo'den (Gael. *Cuil-odir*, probably *Cul-oitir*, 'the back of the low promontory'), also called **Drummoss'ie Moor**, formerly a desolate moor near the shores of Beauly Firth, 5 miles N.E. of Inverness. Here the Highlanders under Prince Charles Stuart were defeated by the royal troops under the Duke of Cumberland, and the cause of the Stuarts was crushed, 16th April 1746. Much of the original moor is now under cultivation.

Culm (Welsh, *cwlm*), a provincial term for an inferior kind of anthracite, used chiefly in the making of lime. The anthracitic shales of N. Devon are sometimes called the *C. measures*.

Culm, in botany, is the peculiar, jointed, hollow cylindric stem of grasses.

Culmina'tion of a star is the moment at which it passes the meridian, being then at its highest elevation above the horizon.

Cúl'na, a town of India, in the executive district of Burdwan, province of Bengal, and on the right bank of the Hooghly, about 50 miles above Calcutta. There is a trade in rice, grain, cotton, and silk, C. being a convenient station for steamers plying between Calcutta and the upper districts. C. has numerous Hindu temples, and is a mission-station of the Free Church. Pop. (1872) 27,336.

Cul'pa (Lat. 'fault'), is a term of Scotch law, the doctrine regarding which it has taken from the Roman. There are held to be three degrees of C.—*lata*, *levis*, and *levissima*. The first is gross carelessness or omission, which may be criminal (see CRIME), and equivalent to Dole (q. v.). The second is that degree of carelessness which one generally attentive to his affairs may fall into. The last is that slighter degree of neglect which must occasionally be shown even by the most circumspect. *C. levis* and *C. levissima* are often of legal importance in contracts, whether constituted by implication or otherwise. See BORROWING, COMMODATE.

Cul'pable Hom'icide. See HOMICIDE and MURDER.

Cul'prit, in English law, is a prisoner accused but not convicted. The equivalent term in Scotland is *panel*.

Culross (Gael. *cul*, 'the back,' and *ross*, 'a peninsula,' 'the *back* or *neck* of the peninsula'), an old royal burgh and seaport of Perthshire, on the N. shore of the Firth of Forth, about 22 miles N.N.W. of Edinburgh. It stands on the side of a hill, and possesses the ruins of a chapel, dedicated to St Kentigern (q. v.), and of a Cistercian abbey, founded in 1217. The chief manufacture now is of linen. There was a considerable trade in coal and iron at C. during the 16th and 17th centuries. C. received its charter from James VI. in 1588, and, along with Stirling, Dunfermline, Inverkeithing, and S. Queensferry, returns one member to Parliament. Pop. (1871) 467.

Cultiros'tres (Lat. 'knife-billed' or 'ploughshare-billed'), a family of Grallatorial or Wading birds, with elongated bills, which are compressed from side to side. The legs are long and slender, the tibiæ being unfeathered for a considerable portion of their extent. The feet have four toes each, and the bases of the toes are webbed. The Cranes (q.v.), Storks (q. v.), Herons (q. v.), Ibises (q. v.), &c., are included in this family.


Crowned Crane—(*Cultirostres*).

Cultiva'tor, an implement with six or seven tines, or curved, broad-pointed pieces of iron for penetrating the soil. Unlike the plough, the C. does not turn up the land in furrows, but tears it up, leaving it in clods through which air has free access. The tines can be set to any depth required, according to the quality of the ground and the crop it is intended to bear.

Cul'verin (Fr. *couleuvrine*, from *couleuvre*, Lat. *colubra*, 'a snake'), a long cannon of the 16th c., which weighed about two tons and a half, and carried a shot of about 18lbs. A *demi-C.* carried half the weight of shot, and weighed about a ton and a half.

Cul'vert (Fr. *couvert*, 'covered'), an arched channel built under a canal for purposes of drainage, also the arched drain under a railway.

Cu'mæ, a coast-city of Campania, near C. Misenum, was founded jointly by the Chalcidians of Eubœa and the Cymæans of Æolis, and was one of the most ancient and most famous of the Greek colonies in Italy. Its wealth and prosperity rapidly increased, and from 700–500 B.C. it was the foremost city of Southern Italy. C. first appears in history as successfully repelling an invasion of Etruscans. During the reign of the despot Aristodemus (B.C. 505–485), Tarquinius Superbus, when banished from Rome, fled to C., where he died, B.C. 496. C. was completely overthrown by the Sabines, B.C. 420. It was admitted to the Roman franchise in B.C. 388, and in the second Punic War Sempronius Gracchus repulsed Hannibal from its walls. From this time C. appears chiefly as a place of luxurious retirement for wealthy Romans. Under the Empire it was noted for the manufacture of red earthenware and of nets. According to tradition, C. was the abode of the Sibyl (q. v.). Her cave was destroyed by Narses in the siege of C., but an artificial excavation on the banks of Lake Avernus is still popularly called *Grotta della Sibilla*.

Cuma'na, one of the United States of Venezuela, S. America, is bounded N. by the Caribbean Sea, E. by the Atlantic, S. by the Orinoco, and W. by Caracas. It abounds in excellent pastures, and cattle are extensively reared. Pop. (1873) 55,476.

Cumana, the capital of the same state, lies at the mouth of the Manzanares, on the Gulf of Cariaco. Pop. (1873) 9427. It is the oldest European city in America, having been founded in 1521, under the name of New Toledo, and has a capacious port, defended by Fort Antonio. There is a considerable export trade in mules, cattle, smoked meat, and dried fish. C. has on several occasions been almost entirely destroyed by earthquakes.

Cum'berland ('the land of the *Cumbrians*, or perhaps the *land of coombes*,' *i.e.*, valleys), the most north-westerly county of England, bounded N. by Scotland and the Solway Firth, W. by the Irish Sea, S. by Lancashire, E. by Westmoreland, Durham, and Northumberland. Greatest length, 75 miles; average breadth, 22 miles; area, 1516 sq. miles; pop. (1871) 220,253. Much of the surface is rugged and mountainous, with deep narrow valleys or dales, in which are the C. lakes and waterfalls, or 'forces,' celebrated for their picturesque beauty. Several of the mountains are above 3000 feet, as Scawfell, Helvellyn, and Skiddaw. The largest of the lakes, Keswick, Derwentwater (q. v.), Ulleswater (q. v.), and Wastwater (q. v.), attract numerous visitors—the first two by their smiling beauty, the last by its gloomy grandeur. The chief rivers are the Eden, the Esk, and the Derwent. Geologically the Lake District is Silurian, and contains numerous slate-quarries; there is, however, much granite and trap, and new red sandstone crops out boldly at St Bee's Head. C. is rich in minerals, including coal, iron (especially a very rich hæmatite ore), plumbago, silver, copper, lead, gypsum, and marl, and there are large quarries of limestone, marble, and slate. From the extreme moisture of the climate (the rainfall at Keswick is 68 inches annually), stock-rearing is more profitable than grain-cropping; the turnip crops are generally superior. In 1875 the total acreage under all kinds of crops was 545,716, of which 96,668 were under corn, 46,695 under green crops, and 99,701 under clover, sanfoil, and grasses under rotation. C. possesses a race of yeomen-proprietors, locally called *statesmen*, marked by their shrewdness, thrift, and independent spirit. The chief manufactures are iron, pottery, paper, and flax. The principal towns are Carlisle, Whitehaven, Workington, and Cockermouth. C. returns eight members to Parliament—four for the county, which is divided into E. and W. C., two for Carlisle, one for Cockermouth, and one for Whitehaven. See CUMBRIA.

Cum'berland, a town in Maryland, capital of Alleghany county, on the N. bank of the Potomac, in the Alleghany Mountains, 179 miles W. of Baltimore. It is contiguous to the C. bituminous coal region, and has a large trade. Pop. (1870) 8056.

Cum'berland, a manufacturing town in Rhode Island, on the Blackstone River, 10 miles N. of Providence. It has trade in iron, cotton, and shoes. Pop. (1870) 3882.

Cum'berland, Richard, D.D., a scholar, archæologist, and theologian, was born in London, July 13, 1632. After hold-

ing subordinate livings, he was in 1691 appointed Bishop of Peterborough, the duties of which he discharged with perfect fidelity till his death, October 9, 1718. C. wrote several works, the chief of which is his treatise *De Legibus Naturæ*, in answer to Hobbes. His thirst for knowledge and the activity of his mind are shown by his learning Coptic after he had reached the age of eighty-three, and in his celebrated saying, 'It is better to wear out than rust out.'—**Richard C.**, dramatist and miscellaneous writer, great-grandson of the preceding, and grandson, on the mother's side, of Dr Richard Bentley, was born at Cambridge, 19th February 1732. He was educated chiefly at Westminster School and Trinity College, Cambridge, of which he became a fellow. Having been appointed private secretary to the Marquis of Halifax, he filled various offices, and was sent on a special mission to Madrid and Lisbon. Finally, he was made secretary to the Board of Trade, and held the office till the suppression of the Board in 1782, when he retired with a compensation allowance. C. then lived at Tunbridge Wells, where he devoted himself to literature, producing novels, essays, pamphlets, and dramas. He died at London, May 7, 1811. Many of his plays, especially *The West Indian*, *The Jew*, and *The Wheel of Fortune*, were popular at the time of their production, and considerable talent is undoubtedly displayed in his miscellaneous essays under the title of *The Observer*. C. was a vain man, and Sheridan caricatured him in his farce of *The Critic* under the character of Sir Fretful Plagiary. He wrote *Memoirs of his own Life*, which were published at London in 2 vols. 1806–7 (new ed. Lond. and Philad. 1856).

Cum'berland, William Augustus, Duke of, second son of George II., was born in 1721. He entered the army, was wounded at Dettingen in 1743, and defeated by Marshal Saxe at Fontenoy in 1745. In 1746 he ended the second rebellion by the victory of Culloden, but treated the conquered Highlanders with great severity. He was beaten by Saxe at Lawfield in 1747, and had to surrender his army at Kloster-Zeven to the Duc de Richelieu in 1757. C. died October 31, 1765. See *Life of the Duke of C.* (Lond. 1766). He repeatedly figures in Carlyle's *History of Friedrich II.*, and is touched off with good-natured mockery as a military failure. His 'General Orders' of 1745–47 (Henry S. King & Co., Lond. 1876) show that the popular notion of his cruelty after Culloden is at least exaggerated.

Cum'berland Island, a large island between Davis' Strait on the E., the mouth of Hudson's Bay on the W., and Hudson's Strait on the S., and separated by a narrow channel from Cockburn Island on the N.

Cum'berland Presbyte'rians, an American sect which arose about the year 1810, in a time of revival and excitement in Kentucky. The Presbytery of Cumberland, thinking that the times required it, ordained some men who had not gone through the usual course of education, and hence arose a secession from the Presbyterian Church. The C. P., hold the usual evangelical doctrines, with an Arminian interpretation. They are most numerous in the S.W. States. Ministers, 1116; churches, 1948; members, 130,000; annual contributions, $30,000.

Cum'berland River, in Kentucky, U.S., rises in the Cumberland Mountains, and flows in a generally westerly direction for nearly 600 miles, till it joins the Ohio, about 50 miles above the confluence of the latter with the Mississippi.

Cumb'rays, or Great and Little Cumbray ('islands of the Cumbrians or Cymri'), two islands in the Firth of Clyde, between the Ayrshire coast and the island of Bute, and forming part of Buteshire. G. C. is 2½ miles long and 1½ broad. Pop. 1613. The village of Millport in G. C. is a favourite sea-bathing resort of the inhabitants of Glasgow. L. C. is about a mile in length by half a mile in breadth. It is in the parish of W. Kilbride, Ayrshire. Pop. 11. The name is a relic of a remote historical period. See CUMBRIA.

Cumbré Pass, an important pass across the Andes, on the highroad between Santiago, in Chili, and Mendoza, in the Argentine Republic, a little to the S. of Aconcagua. Its greatest height is 12,178 feet above the sea-level.

Cum'bria, or Strathcluyd', the kingdom of the Northern Britons, stretched in the 6th c. from the Clyde to the Dee, from Dumbarton to Chester. Strathcluyd was the earlier name of the country; that of C. not having been given till the 10th c. 'It was the last retreat of the Romanised Britons' (Burton). Its history is very obscure; and it is chiefly memorable as the scene of the labours of St Kentigern. C. was ruled from an early date by kings of Scottish family, but was independent both of the Dalriadic Scots and of the West Saxon kingdom, until, in 924, it submitted to Eadmund the Elder. When the English overran and occupied the district which is now Lancashire and Yorkshire, the Cumbrian kingdom divided into two states; there was 'a gap between the Southern Britons and those of Scotland' (Burton's *History of Scotland*). The northern division was then known as the Strathcluyd kingdom proper, its capital being *Alcluya* (now Dumbarton), and Whithern the seat of its metropolitan church. It comprised the modern counties of Dumbarton, Renfrew, Ayr, Lanark, together with the whole of Galloway. The southern division of the ancient Strathcluyd, known as English C., was granted by Eadmund, King of England, to Malcolm I., King of Scotland, in 945, to be held on tenure of military service. From that time it remained an appanage of the Scottish crown, but was distinctly regarded as an English territorial fief. Its capital under David I. was Carlisle, and its ecclesiastical centre Glasgow. See Freeman's *Norman Conquest*, i. p. 135, *et seq.*; and in his *Historical Essays*, that 'On the Relations between the Crowns of England and Scotland;' also Palgrave's *English Commonwealth*, i. p. 440, *et seq.*

Cumin, Oil of. This is an oily liquid obtained from the seeds of *Cyminum cyminum*. It has a pleasant aromatic odour, and consists of a mixture of a hydrocarbon called *cymole* ($C_{10}H_{14}$) and an oxygenated body called *cuminol* ($C_{10}H_{12}O$).

Cumm'in, or Cum'in (*Cuminum*), a genus of plants belonging to the natural order *Umbelliferæ*, not unlike Fennel (q. v.) in appearance. C.-seeds are the fruits of *C. Cyminum*. They are larger than the Caraway (q. v.), but are not so agreeable or efficacious as these, though used for the same purposes, viz., as a carminative and spice. In Holland, and even in this country, they are sometimes put into cheese, and in Germany into bread. The volatile oil which they contain is known as *oil of C.* The seeds are chiefly brought to Britain from Sicily and Malta, and are to some extent used in Sweden, Norway, and Denmark to flavour corn-spirit (*aquavit*).

The fruits of *Lagoecia cuminoides*, a native of the Levant, and also belonging to the *Umbelliferæ*, have similar qualities. The C. of the Scriptures probably included not only this species but also the *black C.*, a species of *Nigella* (q. v.). The ancients considered that its smoked seeds produced pallor of the countenance.

Cum'nock ('the meeting of the waters,' from the Celt. *cumar*, 'meeting,' and *oich*, 'water'), the name of two places.—**Old C.** is in the S.E. of Ayrshire, on the left bank of the Lugar, near to where it is joined by the Glasnock, 16 miles E. of Ayr, and a station on the Glasgow and South-Western Railway, which crosses the Lugar about a quarter of a mile from the town by a magnificent viaduct 170 feet in height. Pop. including parish (1871), 4041. The manufacture of wooden snuff boxes, for which C. was once noted, has much declined. There are rich coal and iron mines in the district, and manufactures of coarse pottery and agricultural implements.—**New C.** lies 5 miles to the S., and is also a station on the Glasgow and South-Western Railway. Pop. 3434. The district is rich in minerals, including coal, iron, plumbago, and antimony.

Cum'yn, Com'yn, or Cumm'ing, a Scoto-Norman family deriving its name from the town of *Comines* in the N.E. of France, and descended from an ancient family in that country.—**Robertus de C.**, who came to England at the Norman conquest, is supposed to be the ancestor of all of that name in Scotland, where his nephew William became chancellor. The grand-nephew of the chancellor married Hexilda, grand-daughter of the King, Donald Bane, and niece of Malcolm Canmore. His great-grandson by this marriage, **John the Black C.**, Lord of Badenoch, was a competitor for the Scottish crown in 1292.—**John the Red C.**, a son of the competitor, was the rival of Bruce. The two rivals met privately, February 1306, before the altar of the convent of the Minorite Friars, Dumfries. High words arose about treachery and falsehood, and Bruce stabbed C. and fled. The Comyns, who had by alliances acquired immense power in Scotland, were almost swept away in the war of independence. The male line of the family, how-

ever, still survives, and is represented by Sir William Gordon Cumming of Altyre. See *The Records of the Bruces and the Cummings*, by M. E. Cumming-Bruce, 1870.

Cunax'a, the scene of the battle described by Xenophon, in which Cyrus the Younger was defeated and slain by his brother Artaxerxes Mnemon (401 B.C.). The exact spot is not quite certain; but most authorities agree in placing it on the left bank of the Euphrates, nearly 60 miles N. by W. of Babylon.

Cundinamar'ca, one of the United States of Colombia, obtaining its name from an American goddess, who, among other divinities, was worshipped before the Mexicans conquered the country. Ruins of temples, broken statues, and monuments are now the sole relics of a forgotten religion. The chief town is Santa Fe de Bogota. Area, 57,000 sq. miles; pop. (1870) 409,602.

Cu'neiform (Fr. *tête-à-clou*, Ger. *keil-förmig*), or wedge-shaped, is the name given to the wedge-shaped or arrowhead writing used in the trilingual public inscriptions of the Persian monarchy (the three languages being Persian, Median or Scythic, and Assyrian or Babylonian), and in an immense variety of inscriptions on cylinders, tablets, bricks, both public and private, which have been discovered chiefly on or near the sites of Nineveh, Babylon, Asshur, &c., and in Egypt, and from which many interesting fragments of ancient Assyrian and Chaldean history are now being constructed. The characteristic example of the later C. is the Behistun inscription, which contains a valuable history of the conquests of Darius. (See BEHISTUN.) The deciphering of C. began properly in the 19th c. Previously various baseless theories were held. It was said to be the work of worms (who must certainly have had geometrical instincts); the remains of a primitive digital alphabet; a system of arbitrary sacred talismans, of which the key had been lost. Niebuhr first suggested that the inscriptions were repeated in three languages, and in 1802 Grotefend of Gottingen deciphered the names of Cyrus, Darius, Xerxes, and Hystaspes, or eight letters out of thirty to which he assigned equivalents. He did so not from any laborious comparison of individual signs, but by a shrewd historical guess as to the probable form and subject of the inscription. Grotefend wrote chiefly in the *Mines de l'Orient* (vols. iv., v., vi.), but his results are given in *Heeren's Researches*, by Talboys, vol. ii. Little was added by St Martin, whose studies on the subject, from 1823 to 1832, are preserved in the *Aperçu de l'Origine des Diverses Écritures* by the learned Klaproth. The important characters representing *m* and *n* were discovered by Rask (*Ueber das Alter und die Echtheit der Zend-sprache*, Berl. 1826). In 1836 Burnouf published an elaborate *Mémoire sur Deux Inscriptions Cunéiformes trouvés près d'Hamadan*, to which we owe the verification of the characters for *k*, *gh*, *b*, and *z*. In the same year Lassen of Bonn discovered twelve characters (including *i*, *g*, *w*, and several aspirates), which he published in *Die Alt. Persischen Keil-Inschriften von Persepolis*. Rawlinson in 1835, from personal examination of the sculptured tablets at Hamadan, deciphered independently the Achæmenian proper names, as Grotefend had done from the inscriptions at Persepolis, copied by Niebuhr. The collation of the Behistun with the Elwend further supplied the native names of Arsames, Ariaramnes, Teispes, Achæmenes, and Persia. Greatly assisted by the philological suggestions of Burnouf's work on the Zend-Avesta, the language of which is supposed, with the exception of Vedic Sanskrit, most nearly to approach the language of the Persian C., and by the further discoveries in the C. alphabet of Lassen, Jacquet, and Beer, Rawlinson completed an alphabet which was substantially original, and proceeded to his work of translation of the Behistun inscription, which was wholly original. By translation here is meant, not the mere deciphering of particular names, but the rendering of the different members of a sentence according to their etymologies and grammatical relations. With regard to the origin of C., Rawlinson thinks it possible that pictorial representations, and not mere arbitrary arrangement, may have led to the formation of the primitive phonetic character; that the three kinds of C. do not belong to one type of alphabet and language, as has been maintained by Botta and others, but that the Babylonian is the oldest, and has probably been largely derived from the Egyptian written character. The Babylonian C. of the third column in the Persian inscriptions is, however, different from that which appears on cylinders and bricks at Shinar, Birs Nimrod, &c., and also as a lapidary character on Sir Harford Jones' stone, on the naked rock at Sheikhan, between the ancient capitals of Resen and Calah, &c. The latter form Rawlinson considers to be the primitive C., or Babylonian proper; the former he calls the Achæmenian-Babylonian. The early Chaldean brick inscriptions at Warka (ancient *Erech*) sometimes pass into a character formed entirely by straight lines of uniform thickness, apparently impressed by a single stamp, which has been called *hieratic*. The hieratic is said to be pictorial, a 'god' being represented by an eight-rayed star, a 'hand' by four shorter and one longer parallels connected by a perpendicular, a 'house' by what resembles the rectangular ground-plan of a house. A singular character, used for the feminine of *one* (Fr. *une*), has been traced to the likeness of the double-toothed comb used by Chaldean women. So also the early ideograph for 'king' has been said to resemble the figure of a bee, an Egyptian emblem of sovereignty. From this C. gradually developed, as clay took the place of stone, a tool with a triangular point in ivory being used. From the variety of dialects the C. signs came to have different phonetic values. The Chaldean characters are of three kinds—letters proper, monograms, and determinatives. The public writings are chiefly on bricks; those on the sealed tablets under clay envelopes chiefly contain private contracts, wills, &c. In the same way the Assyrian branch of the complicated C. writing is divided into (1) the Medo-Assyrian alphabet, which (with the exception of the trilingual inscription of Xerxes) is exclusively found on the rocks at Van and in the neighbourhood, and which occurs at Dash Tappek in the plain of Mujandab, and on the stone pillars at the Pass of Kel-i-shin; (2) the true Assyrian, which is found on the marbles of Khorsabad and in the ruins of Nineveh and Calah. As might be expected from the national history, the Babylonian and Assyrian characters sometimes overlap. The Assyrian C. is much less archaic than the Chaldean. Only a few straight lines are seen, and the wedge often appears very much elongated, or contracted to a triangle, or broadened out, or doubled so as to form an arrowhead, all these forms assuming various directions. The 366 chief characters represent syllables rather than letters, each of the sixteen consonants forming six syllables by means of the three vowels. A second class of syllables is formed by two consonants and a vowel. The determinative stroke before or after merely announces what class of noun is to follow. The Median C., used for translation in all the Achæmenian trilingual inscriptions, even in Egypt, as on the Suez stone, has been called Scythic and Turanian by Norris, who treats it very fully in the *Journal* of the Asiatic Society, vol. xv., 1855. It is not certain whether this syllabarium of 100 characters was invented or adopted by the Turanian people of Zagros. It comes much nearer the idea of an alphabet than the other forms of C. The forms are simpler, five wedges being the maximum. The only diagonal sign is the single wedge which separates words. Lastly, there is the Elymean C., which is found in the vicinity of Mal Amir, the ancient city of the Uxii, and which has been copied by Layard. The Babylonian C. varies from all other Semitic writing in being written from left to right. Each consonant apparently possesses a mute and a sonant sign, so that in expressing a dissyllable in which such a consonant was medial, either or both of the alternative forms might be used. The vowel sounds are inherent in the sonant consonants (perhaps also at the beginning of the mutes), but for greater clearness it was permitted to represent the vowels by definite signs. Redundant consonants are introduced for euphony. These are among the causes of the great diversity in the orthography of C. Another feature is the constant occurrence of compound vowel articulations in the interior of words, of which, owing to the inherence of the *a* in the preceding consonant, the second element only is expressed. Generally, it varies from Sanskrit in possessing no aspirated sonant; it only has the surd, the aspirated surd, and the sonant.

Besides the great Behistun inscription, there are many of less importance scattered through the Persian Empire, and especially at Persepolis, Hamadan, and Van. Many of these, however, consist simply of a formula of invocation to Ormazd and a repetition of royal titles. Thus, on the ruined pilasters of Murghab or Pasargadæ appears this legend, the oldest of the Persian C.—'Adam Kurush, Khshaya thiya, Hakhamanishiya: I am Cyrus the King, the Achæmenian.' The trilingual legends of Darius at Persepolis are chiefly on the platform, the pillared colonnade,

and the palace marked G on Niebuhr's plan. One of them, which has been copied by Porter and Westergaard, is found on a huge slab, 26 feet long and 6 feet high, in the southern wall of the platform. It appeals to Ormazd to save the province of Persia from war, slavery, decrepitude, and lying. The titles often suggest questions of history and geography. Thus Darius puts 'Sparda' among the list of countries who are afraid of him, and bring him tribute. Does this mean Lacedæmon, or merely the Dorian colonies in Asia Minor? Another tablet at the foot of the mountain Alwand, near the town of Hamadan, probably commemorates a royal visit to the Median capital. Ormazd appears in the amiable character of *dadar*, or giver of justice. The Median and Persian inscription of Naksh-i-kustam on the rock-hewn sepulchre of Darius near Persepolis was for long a riddle to travellers. Dr Fryer, quoted in Sir William Ouseley's *Travels* (ii. 296), was content 'to stare on them from beneath, they being fit only for atlasses or winged-folk to look into, there being no passage into them.' A French artist, more ambitious, was drawn up by a rope, but Westergaard's copy was taken by means of a powerful telescope. The writing is probably subsequent to the expedition of Mardonius (B.C. 492), and refers to the Greeks as Scythians beyond the sea. Other members of the Darius series of C. writings were found on a Babylonian cylinder in the British Museum, on the Suez stone near the embouchure of the old canal leading from the Nile to the Red Sea, and on the window-frames of the palace of Darius at Persepolis. There is also a considerable number of Xerxes inscriptions. Those at Hamadan, as they relate no history, contain no admonition, and do not even solicit the protection of *Auramazda*, are probably memorials of the annual journeys made from Babylon to Ecbatana by the old 'road of Semiramis,' across Mount Orontes, by the Ganj Namek, a route coinciding with that of Isidore from Kangawar to Artaman. At Persepolis the Xerxes inscriptions consist of (1) the statements of title in the doorways (both over the king's head and on the folds of his robe), and as a border to the false windows of the palace; (2) more elaborate, but quite formal, statements (including a reference to the building of the palace), which appear on the interior pilasters and on the sculptured staircase leading to the terrace of the Hall of Columns. The twelve small tablets over the colossal animals on the two great portals long remained inaccessible to travellers, although their existence was observed by Gemelli Carreri, who visited Persepolis towards the end of the 17th c., and by Tavernier (1663). The name of *Parsa* for the palace, or metropolitan building, as distinguished from the country, province, or state, occurs here. Another pilaster legend at the S.W. corner of the palace indicates that both Darius and Xerxes took a part in its construction. All these inscriptions are contained in Lassen's *Treatise of C. Inscriptions*, in Rawlinson's *Memoirs on Persian C.*, in *Zeitschrift für die Kunde des Morgenlandes*, vol. vi., and the *Journal* of the Asiatic Society, vol. x. Plates will be found in Morier's *Travels*, Ouseley's *Travels*, Rich's *Babylon and Persepolis*, Porter's *Travels in Georgia*, &c. See also Heerens' *Researches*, by Talboys, vol. ii. There is a trilingual C. writing relating to Xerxes on the vase of the Comte de Caylus, of which there is a duplicate on the vase found at Halicarnassus by Mr Newton. It has a hieroglyphic translation, to which Champollion and Grotefend attached the greatest importance as a source of phonetic values before the C. writing was properly understood. Loftus recovered at Susa some fragments of vases with a Xerxes legend After the time of Xerxes the C. seems to have fallen into disuse. No record of Artaxerxes Longimanus or of Artaxerxes Mnemon has been discovered, and the attribution of the cylinder and Suez stone to the intervening reign of Darius Nothus depends on mere conjecture. The buildings at Persepolis ascribed to this period of the Achæmenian dynasty, though elaborately sculptured, have no writings. After the lapse of a century Artaxerxes Ochus, fourth in descent from Xerxes, resumed the ancient art of composition. We have of this monarch two inscriptions at Persepolis—one on the northern face of the platform, marked H on Niebuhr's plan, the other on the western staircase added to the palace by Artaxerxes. In these he traces his descent from Hystaspes (whom, however, he does not call 'royal,' thus differing from the Behistun inscription of Darius), explains that he has made this well-sculptured piece of masonry *for his own convenience*, and calls on Ormazd and Mithra (the sun) to protect him. Both inscriptions are marked by bad grammar, which has been the despair of decipherers. The words 'for his own convenience' are supposed to refer to a private entrance from a pavilion to the palace. There is another C. writing relative to Artaxerxes Ochus on an Egyptian vase of grey porphyry in the treasury of St Mark's at Venice. It has a very singular hieroglyphic equivalent, deciphered by Sir Gardener Wilkinson, and the royal name is degraded into *Ardakhchasche*. In these strictly Persian inscriptions there are thirty-six or thirty-seven forms, expressing twenty-three distinct sounds. The size of the character varies from two inches to one-sixth of an inch.

Cun'eiform Bones. These are three bones in the tarsus or arch of the foot, so named on account of their wedge-like shape. With the cuboid bone they form the anterior row of the tarsal bones. They are termed from their position, internal, middle, and external. See FOOT, TARSUS.

Cunn'ingham, Allan, a Scottish poet and man of letters, was born 7th December 1784, at Blackwood, near Dumfries. His parents were humble, and at an early age he was apprenticed to a stonemason. He worked hard at his business in Dumfries, while he gave his leisure to the Muses. He first (1810) became known beyond his native country in connection with Cromek's *Remains of Nithsdale and Galloway Song*, to which he gave what purported to be old ballads, but were really his own composition. After this he was acknowledged to be among Scottish poets next in power to Hogg, and gained the high esteem of Sir Walter Scott, who called him 'Honest Allan.' He removed to London, where, after being for a short time a parliamentary reporter, he became manager in Chantrey's studio. Meanwhile he wrote steadily, his works including novels, poems, a drama, and such books as a *Life of Burns*, a *Life of Sir David Wilkie*, *Lives of British Painters*, &c. Yet he always considered literature as his staff, not his crutch. C. died October 29, 1842. He will be best remembered for his poems and songs, which, though somewhat florid, are genuine and thoroughly Scottish. The best biography is that containing extracts from his correspondence and works by the Rev. David Hogg of Kirkmahoe (1875).—**Peter C.**, son of the preceding, was born at Pimlico, April 7, 1816. In 1834 he received a Government situation, and devoted his spare time to literary work, the varied character of which may be judged from the titles of some of his books—*Handbook of London*, *Life of Inigo Jones*, *Life of Drummond of Hawthornden*, editions of Johnson's *Lives of the Poets*, Goldsmith's *Works*, Horace Walpole's *Letters*, &c. C., who contributed largely to magazines, died May 8, 1869.

Cunningham'ia, a genus of lofty and graceful Coniferous trees, of which only one species, *C. sinensis*, a native of Southern China, is known. It can, however, only be grown in conservatories.

Cunonia'ceæ (*Ochranthaceæ*), a natural order of Dicotyledonous plants closely allied to the saxifrages. About a hundred species and twenty genera, natives chiefly of tropical regions and of the southern hemisphere, and especially of Australia, are known. *Weinmannia*, *Callicoma*, *Ceratopetalum*, and *Caldcluvia* are examples. They have astringent properties, and some have been used for tanning, while others exude a gummy excretion.

Cup, Divination by, a mode of divining still practised among the vulgar, by examining the arrangement of the sediment in the bottom of a teacup. The practice has been borrowed from the ancient Egyptians, who, after throwing pieces of the precious metals into a C. of water, in which engraved gems had been placed, invoked the infernal gods to furnish the information desired.

Cupa'nia, a genus of trees or shrubs of the natural order *Sapindaceæ*, numbering about fifty species, found in most tropical countries, but most abundantly in S. America. *C. edulis*, or *Blighia sapida*, is the Akee-tree of the W. Indies, where the negro women use the distilled water of the flowers as a cosmetic. The seeds are surrounded by a succulent, slightly acid aril, which is much esteemed as an article of food. A decoction of the seeds is said to be efficacious in diarrhœa. The lofty tulip-tree of eastern tropical Australia (*C.* or *Harpulia pendula*) has a light-coloured wood, interspersed with darker-coloured patches, and is valued by the cabinetmaker from its being susceptible of a

high degree of polish. Dr Spruce mentions the curious fact that the embryos of *C. cinerea*, a Peruvian species, 'fall out of the seeds, while the outer coating or husk of the seeds, with their aril contained in the burst capsules, still remain on the trees.' The 'Loblolly woods' of Jamaica also belong to this genus.

Cu'par or **Cou'par-An'gus**, a town partly in Perthshire and partly in Forfarshire, on the Isla, about 13 miles N.E. of Perth, and a station on the railway from Perth to Aberdeen. It has bleachfields, manufactures of coarse linen fabrics, and a trade in timber. From its occupying the centre of Strathmore ('the great valley'), it is sometimes called the capital of the 'How' of Mearns. The remains of two Roman camps are in the neighbourhood of the town, on the site of one of which Malcolm IV. erected a monastery, now in ruins. Pop. (1871) 2149.

Cu'par-Fife', the county town of Fifeshire, on the Eden, 27 miles N. by E. of Edinburgh, and a station on the Edinburgh, Perth, and Dundee section of the North British Railway. The principal manufactures are linens and bricks, and there are breweries, tanneries, and flour-mills. Pop. (1871) 5105. C. was erected into a royal burgh by David II. in 1363. Sir David Lyndsay's satiric interlude of *The Three Estatis* was acted in 1555 on a mound at the E. end of the town, on which stood an ancient castle of the Macduffs, Thanes of Fife. C. unites with St Andrews, Kilrenny, Crail, Pittenweem, and E. and W. Anstruther in sending a member to Parliament.

Cu'pel and **Cupella'tion.** See ASSAY, SILVER, and LEAD.

Cup'id (Lat. *cupido*, from *cupio*, 'I desire'), a modification of the Greek Eros, when his worship was transferred from Greece to Rome. He is generally described as a son of Venus, either by Mercury, Mars, or even by Jupiter. C. was the god of sensual love, who swayed alike gods, men, and all living creatures. His attributes are the bow, arrows, quiver, and golden wings, and from the blindness of his action he is often represented with bandaged eyes. Originally conceived of as a model of perfect youthful beauty, he gradually came to be represented as a chubby boy.

Cu'pola (Ital. from the same root as the Eng. *cup*) is the concave ceiling or vault forming the roof of a building. See DOME.

Cu'pola, a small blast-furnace used for the re-melting of raw pig-iron, in order that it may be cast into suitable forms in the Foundry (q. v.).

Cupp'ing, a surgical operation now somewhat rare, but at one time so frequent that it was generally performed by specialists called 'cuppers.' It is of two kinds—*dry C.* and *wet C.* The former consists in producing congestion of a part; the latter, in abstracting blood from a part to which dry C. has just been applied. The instruments necessary for the purpose are—(1) a glass, resembling a common tumbler; (2) a spirit-lamp (when these are not at hand, a candle and a common tumbler will serve the pupose); and (3) when wet C. is to be performed, an instrument containing lancets (scarificator) to pierce the skin, that blood may be withdrawn. The lancets are concealed within the instrument, and by moving a trigger they project through slits and cut the skin. Their number varies, but they are so arranged as to cut exactly to the required depth. In C. the part is first sponged with hot water, which produces local congestion. The air is exhausted from the glass by means of the spirit-lamp, and the glass is then quickly placed on the part already sponged. This increases much the flow of blood to the part. This part of the operation is dry C. The scarificator is now applied, which cuts the skin, and the glass having the air re-exhausted by the spirit-lamp is again applied, and is now rapidly filled with blood. The number of glasses will depend on the amount of blood to be abstracted; each glass takes about four or six ounces of blood. The lancets must be so arranged as only to cut through the true skin; when they cut deeper, the fat underneath the skin prevents the free escape of the blood.

Cu'pule, the cup in which the fruit (acorn) of the oak and the nut of the Spanish chestnut is contained, and is a sort of involucre composed of a number of adherent bracts. It is also applied to a cuplike body found in some fungi, such as *Peziza*.

Cupulif'eræ, or **Coryla'ceæ**, the Oak or Mastwort order, a natural order of Dicotyledonous plants, consisting of trees and shrubs, abundant in the forests of temperate regions, though a few are found in the highlands of tropical and hot climates. In all about 300 species, distributed over eight or nine genera, are described. *Quercus* (oak), *Corylus* (hazel), *Castanea* (chestnut), *Carpinis* (hornbeam), are the best known. C. are mainly important for producing excellent timber, though the seeds of many of them are edible, and others have astringent barks and cupules. See also AMENIFERÆ.

Cupress'us and **Cupress'ineæ.** See CYPRESS.

Curaça'o, one of the West India Islands, lies E. of the opening to the Gulf of Maracaibo, about 75 miles off the Venezuelan coast, S. America. Area, 215 sq. miles; pop. (1872) 21,900. The capital, Willemstadt, is situated on the S. coast. Like the neighbouring islands of Aruba (pop. 4487) and Buen Ayre (pop. 3980), C. produces tobacco, maize, figs, cocoanuts, citrons, oranges, &c., and carries on an export trade in maize, beans, cattle, salt, &c., chiefly with the contiguous coast. It gives name to a liqueur (*curaçoa*) or sweetened spirit, which owes its peculiar flavour chiefly to the rind of Curaçoa Oranges (q. v.). In addition to that ingredient, a proportion of cinnamon, mace, and other sweet spices is used in the preparation of curaçoa. C. was discovered by the Spaniards in 1527, conquered by the Dutch in 1634, taken by the English in 1807, and restored to the Dutch in 1815.

Curaço'a Oranges, the immature fruits of the ordinary Seville or bitter orange, *Citrus vulgaris* of Risso. They are valued for their rind, which has a very pleasant aromatic odour and a bitter taste, and is largely used in medicine as an aromatic tonic, and in the preparation of the favourite liqueur *curaçoa*.

Cu'rarine is an Alkaloid (q. v.) contained in *curara*, *urari*, *woorara* or *woorali*, a resinous substance used by the S. American Indians to poison their arrows. C. is an amorphous body with a bitter taste. It acts as a violent poison when introduced directly into the blood, but is comparatively harmless when swallowed. Its physiological action is peculiar, for it paralyses the nerves of motion without affecting those of sense.

Curass'ow, or **Hocc'o** (*Crax*), a family of Rasorial birds (*Cracidæ*), representing in America the Old World pheasants. The bill is arched, the nostrils are basal, the wings short and rounded, the tail long and very broad, the tarsi stout, the toes slender, and the hind toes as long, and situated in the same plane, as the front toes. The common crested C. (*Crax alector*) is as large as a turkey, and occurs in Brazil and Guiana. Its colour is black, the belly and tail-crests white. The head has a crest of tufted feathers. The red C. (*C. rubra*) has been domesticated in Holland. Another species is the *C. globicera*, and this latter, and the Pauxi or *Ourax pauxi*, has a knob or tubercle at the base of the bill.

Cu'rate (lit. 'one who has the care (Lat. *cura*) of souls') is the lowest degree in the Church of England. By 1 and 2 Vict. c. 106, where an incumbent does not duly reside, the bishop is empowered to grant a certain fixed salary to the C. out of the proceeds of the benefice. This shall not be less than £80 a year, unless the value of the benefice is under £80 a year; in which event the salary of the C. shall be the full value of the benefice.

Curatell'a, a genus of small Dillineaceous trees from tropical Africa, the rough leaves of one of which (*C. Americana*) are used in Guiana for polishing.

Cura'tor, a kind of guardian appointed by the Court of Session in Scotland. The powers and duties of curators vary with the nature of their appointment, and the condition of those over whom their guardianship or curatory extends. They may be classed as *C. to a minor, C. to an idiot, C. bonis,* and *C. ad litem.*

Curator to a Minor.—A minor in Scotland, until he arrives at puberty (see AGE), which in males is fourteen and in females twelve years, is under the guardianship of a tutor. (See PUPIL, TUTOR.) From puberty to majority he is under a C. The guardianship, in both cases, vests without legal formality in the father, unless the child is forisfamiliated. (See FORISFAMILIATION.) When the father is dead, or legally disqualified, the

minor has largely the choice of his curators, but their appointment requires the sanction of the court. All deeds executed or contracts entered into by a minor without consent of his curators are ineffectual against the minor, but they may be held binding on the other party. The term in English law corresponding to C. to a M. is *Guardian* (q. v.).

Curator to an Idiot is appointed under a brieve of Chancery. (See BRIEVE.) He is intrusted with the person as well as with the estate of his ward. The court appoints to the office the nearest male relation on the father's side, except when a wife is fatuous; in which case the husband becomes C. Curators to insane persons are subject to the provisions of the Pupils' Protection Act (q. v.).

Curator Bonis.—When an heir is deliberating whether or not he shall enter (see ENTRY OF AN HEIR), when an infant is without a tutor, when a succession opens to one resident abroad, when trustees have declined to accept or cannot legally do so, and in similar cases, the court appoints a C. B. He is subject to the provisions of the court's Act of Sederunt relative to judicial factors (see JUDICIAL FACTOR), and to the provisions of the Pupils' Protection Act (q. v.).

Curator ad Litem is appointed by the court to attend to the interest of a minor in a law-suit or in other judicial proceedings. When a minor has curators at the beginning of legal procedure, they act as *curators ad litem*.

Curb, in veterinary science, means a strain of the extensor ligaments or tendons running down the back of the 'hock' in horses. This lesion occurs chiefly from sudden starts or great exertion, or from the effort made in keeping back a heavy load in descending a hill The symptoms are swelling and inflammation in the joint, and consequent lameness, which may disappear afterwards, when the animal has been exercised for some time. The treatment consists in rest and fomentations during the active stages of the inflammation, together with cold applications afterwards, and blistering to allay any tendency to swelling that may remain.

Cur'cas. See PHYSIC-NUT.

Curcu'ligo, a genus of herbaceous plants of the natural order *Hypoxidaceæ*, natives of S. Africa and tropical Australia and India. The roots of *C. orchioides* are used in Travancore as a native cure for gonorrhœa, menorrhægia, &c., and the fleshy roots of some species (like *C. stans* of the Ladrone Islands) are eaten. Most of the genus is bitter and aromatic.

Curcu'lio. See WEEVIL.

Curcu'ma, a genus of annual plants of the natural order *Zingiberaceæ*. Turmeric (q. v.) consists of the old tubers of *C. longa* and other species. The young tubers are colourless, and furnish a kind of arrowroot. East India arrowroot, or C starch, is obtained by bruising and powdering the tubers of *C. angustifolia*, and then throwing the powder into water. Starch is also obtained from *C. rubescens*, *C. leucorhiza*, &c. Zedoary tubers, used in India as an aromatic tonic and as a perfume, are furnished by *C. aromatica* and *C. Zedoria*.

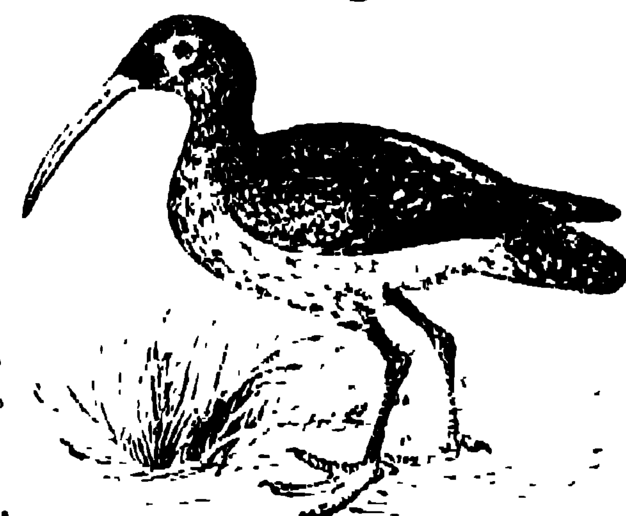
Curd (casein of milk) is a composition similar to the fibrin of wheat, the legumen of bean and pea, and the albumen of egg. It has been suggested by Mulder—and the suggestion is generally accepted—that the cheesy matter in milk is derived directly and without much change from the food upon which the animals live. From a gallon of new milk 1 lb. of C. is produced on the average, but Alderney and Guernsey cattle will give more. According to Dr Voelcker, the ultimate elements of C. are carbon 53·57, hydrogen 7·14, nitrogen 15·41, oxygen 22·03, sulphur 1·11, and phosphorus 0·74 per cent. Curds-and-cream form a delightful dish, for which Devonshire is specially famous.

Cur'few (Fr. *couvre-feu*, 'cover fire'), the tolling of the church-bell at eight o'clock, or some other hour in the evening, as a signal for the people to put out their fires and retire for the night. The introduction of this practice into England has been ascribed to William the Conqueror, who is said to have used it as a means of preventing the English from assembling in the evening to concoct plans of rebellion. The tradition is sufficiently ludicrous. There can be little doubt that it owed its introduction into England to the same cause that made it common throughout Europe—viz., as a regulation to prevent fires, which were very frequent when houses were built of wood. The evening-bell still rung in many places in England is called the C., and though the original signification has long passed away, the word has won an abiding-place in our language, mainly through the line in Gray's *Elegy*—

'The curfew tolls the knell of parting day.'

Curl, a destructive disease in potatoes—a variety of chlorosis —in which the tubers 'produce deformed curled shoots of a pallid tint, which are never perfectly developed, and give rise to minute tubers. It is supposed C. arises from the tubers being overripe.' It is a local disease, and quite unknown in many districts (Berkley).

Cur'lew (*Numenius arquata*), a genus of Grallatorial or Wading birds, nearly allied to the *Scolopacinæ* or Snipes, and to the *Tringinæ* or Sandpipers. The bill is long, slender, and curved downwards towards its tip. The face and head are feathered. The tail is short, and the wings, when at rest, reach to the tail. The C. is not migratory. It inhabits the sea coasts, generally, of the Old World, and also of Australia. Its food is chiefly worms and molluscs, and its cry is of a peculiar shrill kind.


Curlew.

'Wild as the scream of the curlew,
From crag to crag the signal flew.'
—*Lady of the Lake.*

The nest is built among grass or heath. The whimbrel (*N. phæopus*) is smaller than the former species, and is also found in Britain, whilst N. American species and the Esquimaux C. (*N. borealis*) are also known.

Cur'ling, a Scottish game on the ice, popular with all ranks. It is usually played on frozen lakes and rivers, though artificial ponds are becoming common. Set matches, called *bonspiels*, are played between rival clubs and parishes, and even between different divisions of the kingdom. A body of rules, generally held as binding, has been issued by the Caledonian Curling Club. C. is played with flattish circular stones, about 9 inches in diameter, from 30 to 45 lbs. in weight, with handles inserted in the upper surface, while the under is carefully polished. A *rink* is formed, from 30 to 40 yards long and 3 broad, at each end of which concentric circles (*broughs*) are drawn, the inner one being named the *tee*, which is the curler's aim—the game much resembling that of bowls. At some distance short of each tee a transverse line is drawn—the *hog-score*—stones failing to cross which are put off the ice. The game is usually 31; the players, four on each side; the last player, or director, being called the *skip*; and a frequent challenge is for a dinner of beef and greens. The game is graphically described in *Guy Mannering*, and Burns' Tam Samson was an adept in it: the following stanza from the humorous *Elegy* contains several of the technical terms of the game:—

'He was the king o' a' the core,
To *guard*, or *draw*, or *wick a bore*;
Or up the *rink* like Jehu roar
In time o' need;
But now he lags on Death's *hog-score*—
Tam Samson's dead.'

Curr'an, John Philpot, a distinguished Irish barrister, orator, and wit, was born of humble parents at Newmarket, near Cork, July 24, 1750, studied at Trinity College, Dublin, and the Middle Temple, London, and was called to the Irish bar in 1775. By his power as a ready and sarcastic speaker he speedily reached forensic eminence, and in 1784 entered Parliament, in which he became celebrated as one of the ablest opponents of the policy of the Government towards Ireland. After the Union, to which he was opposed, C. was made, in 1806, Master of the Rolls. He resigned this post in 1813, and retired on a pension to London, where he died, October 14, 1817. His wit and other attractive social qualities, shown in such books as *Recollections of C.*, will long keep C.'s memory green in the hearts of Englishmen as well as of his own countrymen. See

Life of C. (Lond. 1819), by his son, J. Philpot Curran, by Phillips, and by O. Regan.

Curr'ant, the common name for various species of plants of the genus *Ribes*, but most generally applied to *R. nigrum* and *R. rubrum*, the black and red C. of our gardens. The red C. is a native of the S. of Europe and of Asia, and perhaps N. America, and is most likely only naturalised in Britain. The white C. is a variety of the red C., the result of cultivation, and in addition there are many other varieties and intermediate forms. The black C. is a native of most woods and the banks of streams in Europe and the N. of Asia. Both it and the red are highly prized for preserving in the form of jams and jellies. It is largely grown in some parts of the Continent for the purpose of making the *Liqueur de Cassis*. There are many other closely-allied species in America, India, &c. The red-flowering C. (*R. sanguineum*), so common an ornament of our shrubberies in spring, is a native of America to the W. of the Rocky Mountains. It was introduced into Britain in 1826. Its berries, though insipid, are not poisonous. *R. aureum* is an ornamental shrub from the same regions, producing a fine-flavoured berry. The term C. is applied in Australia to *Leucopogon Richei*, one of the *Epacridaceæ*. Its berries are wholesome. The Indian C. of America is *Symphoricarpus racemosus* (the snow-berry). The native C. of New S. Wales is also *Leucopogon Richei*, while the same name is given in Tasmania to some species of *Coprosma* (natural order *Cinchonaceæ*). The grape C. is a kind of raisins or dried fruit of the Corinth or C.-vine, a small variety of the ordinary vine (*Vitis vinifera*), cultivated chiefly in the Ionian Islands. They are most extensively used in cakes and puddings, but of themselves are highly indigestible.

Currant-Wine, a beverage prepared from the fermented juice of the berries of the red currant (*Ribes rubrum*), to which a proportion of sugar is added. C.-W. is a favourite domestic preparation, and a wholesome and pleasant drink. A kind of liqueur is similarly prepared with the more strongly flavoured black-currant berries.

Curr'ency, the name applied to the medium of exchange or circulating medium used at any time and place. Its uses, direct and indirect, are obvious: the chief are the establishment of one mode of calculating value, the facilitation of exchange where barter could not take place, and the saving of expense and trouble in the exchange itself. Each of these primitive advantages suggests a great expansion of commerce. They have been realised separately: as (1) in the African conventional unit or *macute*, which had no physical existence at all; (2) in the cattle and fur C. of many nations without foreign trade. Now, however, the precious metals are universally recognised as the best basis for exchange; and by the mercantile school were long considered as the only permanent wealth; a fallacy which led to the early prohibitions of importation and the bounties on exportation. The durability and divisibility of gold and silver, their uniform quality when pure, and the facility with which the quality may be tested, have secured them the first place; copper deriving its C. chiefly from the mint-mark, and from being confined to small transactions. Copper was, however, extensively used at Rome, and iron was exclusively used at Sparta. The C. metals fluctuate little in intrinsic value (although the occasional discoveries of gold-fields, *e.g.*, in Australia and California, produce wide and sometimes violent effects on trade), but it was necessary to prevent fraud that the central Government (wherever such existed) should guarantee the purity of the C., and direct that it should be accepted. Hence state coinage and the prohibition of private coining, a privilege which was frightfully abused in systematic debasement by the later Capetian Kings of France and by the Roman Emperors of the East, &c. In Scotland (where James I. had directed the money to be of the like weight and fineness as that of England), there were mints in Edinburgh, Aberdeen, Perth, Dumbarton, Roxburgh, Stirling, Glasgow, and Linlithgow. Notwithstanding this variety of local coinage, there was a great dearth of C. in Scotland; and the 'sterling' silver penny of the English Plantagenets (which had taken the place of the silver penny of the 'Easterlings' or Baltic trading communities) varied so much from the Scots money, that ultimately £100 Scots was equivalent to £8, 6s. 8d. of sterling money. An Act of James II. (1456) tried to retrieve the C., by enacting that several foreign coins in use, such as Henry nobles, dolphins, Rhenish guildings, &c., should 'be cried,' or pass for more than their intrinsic value; and that the coins were to remain in the country. In England, the rude process of minting by shears and hammer had led to extensive clipping and to the institution of the horse-mill. The clipped coin, not being called in, displaced the milled coin; and this produced a state of uncertainty and injustice from which the nation was rescued in 1695 by the Coinage Act, due to the joint efforts of Locke, Somers, and Montague. The new C. was restored to its ancient weight and fineness, and the clipped money was made illegal tender after a certain date. When the milled silver was fully in circulation, the price of the golden guinea fell from 30s. to 21s. 6d. At the Treaty of Union a uniform C. was adopted for England and Scotland, compensation being given for losses through change of denomination. The Scots merks (1⅛d. more valuable than the English shillings) were called in by 'unpremeditated proclamations;' but the premium was claimed for £40,000 worth of English shillings which had been circulating in Scotland as equivalent to Scots merks. In spite of the facilities for smuggling and melting afforded by the small bulk of the precious metals, the British system has survived a good many commercial crises. The value of the C. depends, in the first place, on the supply (*i.e.*, all money in actual circulation) and the demand (*i.e.*, all goods offered for sale); in the second place, supply and demand remaining constant, it depends on cost of production. The relation between the C. and prices is, however, considerably modified by the use of bills of exchange, accommodation bills, promissory-notes, and cheques. These are the instruments of credit. The experiments made in inconvertible paper C., such as the *assignats* of the French Revolution, show that while the substitution of a paper for a metallic C. held in reserve is a national gain, any further increase of paper is a national robbery. The Austrian irredeemable paper florin varies in value from 11 to ½ *grammes* silver. Accordingly, not merely the Bank of England, but the banks of issue in Scotland, are carefully restricted in their note-issue by reference to their store of bullion. From 1797 to 1819 the cash payments of the Bank of England were, in consequence of the war, suspended, large hoards of bullion being required for military purposes; and there was, at one time, a controversy whether the resumption of cash payments, under Peel's Act of 1819, did not unduly benefit those who had advanced money to the state during the depreciation caused by the suspension. The present system of banking in Great Britain was settled by Peel's Bank Charters Acts, 1844 45 (7 and 8 Vict. c. 32, and 8 and 9 Vict. c. 38). A dispute having arisen as to the right of Scotch banks to do business at public offices in England, it is possible that before long the Scotch privilege of issuing notes to the average amount in circulation during the year ending 1st May 1845, *plus* the amount of bullion, may be absorbed in the system of one bank of issue for the United Kingdom. It has lately been suggested that the British Government should charge a coinage-due for the expenses of minting, which amounts to about one-fifth per cent. At present bullion importers pay merely a commission for interest and assaying to the Bank of England. Mr Lowe thinks the charge should be made by reducing the sovereign from 113 to 112 grains fine. The real object of this is to equalise the sovereign, the 25-franc piece, and the 20-mark piece. Such a gold unit would be of great service in preventing or mitigating crises in international trade.

Curr'ents, Ocean. In treating of these, the most permanent of oceanic movements, we shall first enumerate the more important C., of which careful charts are annually prepared by the British Admiralty, and then consider the physical causes which give rise to the phenomena.

According to Captain Duperrey, there are three great C. flowing N. out of the Antarctic Ocean. The *first* flows in a generally easterly direction, till it strikes the W. coast of S. America. Here it divides, the one branch travelling southward, warming the shores of Patagonia, rounding Cape Horn, and then striking E. by N. towards the S. of Africa, uniting at the same time with the *second* Austral current. This combined current separates at the Cape of Good Hope into two branches, the one flowing eastward to Australia, and ultimately mixing with the westerly equatorial C. of the Indian Ocean, the other striking N. along the W. coast of Africa as far as the Gulf of Guinea, where it is turned out across the Atlantic in a due westerly direction towards Cape St Roque, in S. America. Here it divides, the one branch coasting down by Brazil till it meets the first

Austral current, the second continuing in a north-westerly direction towards the Caribbean Sea and the Gulf of Mexico, which it enters, and is then deflected through the Strait of Florida across the Atlantic towards the N.W. coast of Europe, constituting the Gulf Stream. The Gulf Stream divides at the Azores, one part still directing itself towards the N.W., and washing, through the agency of its numerous ramifications, the shores of Spain, France, Great Britain, Ireland, Denmark, Norway, and Spitzbergen, the other part turning S. then W., thus forming the N. equatorial current, which is separated from the S. equatorial by a narrow reversed current flowing towards the Gulf of Guinea. Returning now to the point at which the *first* Austral current breaks on the W. coast of S. America, we may trace the course of the northern branch. After coasting along by Chili and Peru, it is deflected across the Pacific towards the E. Indies, constituting the great S. equatorial current of the Pacific. It is much broken up by the numerous islands of Australasia; and a portion of it travels S. to the E. coast of Australia, where, making a detour, it mingles its waters with the *third* Austral current, which, after flowing E. along the S. coast of Australia, has now struck N.E. towards New Zealand. In the N. Pacific, a *drift-current* (one due to the action of a prevailing wind), flowing E. then S.E. along the N. American coast, is reversed off the Californian seaboard, and returning towards China, forms the N. equatorial current of the Pacific, which is separated from its companion current by a narrow easterly-directed current, as in the case of the corresponding movements of the Atlantic. A portion of the N. equatorial flows up to Japan; but the greater part turns N. and N.E., uniting with the original drift-current of the higher latitudes, thus forming an endless circulating stream of water. The branch of the *second* Austral current which flows eastward to Australia, uniting with a portion of the *third* Austral stream, turns N., and ultimately, as before mentioned, forming the westerly-directed current of the Indian Ocean, gives rise to the Mozambique current between Africa and Madagascar, which is continued S. to the Cape of Good Hope; but here it is stopped by the opposing current from the W. and turned back towards Australia. Of the C. which have their origin in the N. Polar seas, the most important is the Labrador current, which, travelling S. past Labrador and Newfoundland, has been recognised in the *Challenger* soundings in a cold sub-current far S. off the United States coast. These are the principal constant C. There are others, however, deserving notice, which occur especially in the Indian Ocean, and flow one way in summer and the contrary way in winter. Others again appear and disappear in such a desultory manner that they are as yet little understood. The most interesting and important of these O. C. to Europe is undoubtedly the well-known Gulf Stream, whose temperature, higher as it is than that of the waters through which it passes, must have a considerable effect in modifying and equalising the climate of Western Europe. It would be wrong, however, to give this ocean river the whole credit for the great difference existing between the moist, temperate climate of Scotland and the cold, bleak, and frigid climate of Labrador. The prevailing W. and S.W. winds, laden with vapour due to the evaporation of the waters of the Atlantic, are perhaps as important an element in the phenomenon. The Gulf Stream is not distinguishable from the surrounding water in our latitudes, but in the earlier part of its course it is distinctly marked off, being of a deep-blue tinge, and having at its margin an evident fogbank, produced by the condensation of the water vapour as it passes from a warmer to a colder atmosphere. As it enters the Atlantic, it has a velocity of five miles an hour, and a temperature of 89° Fahr.—some 12° warmer than the adjacent sea.

The great cause of O. C. is the action of prevailing winds. The equatorial trade-winds, for instance, induce upon the ocean a surface flow; and as an outflow must necessarily give rise to an indraught, we have here an explanation, taking into account the effect which the distribution of land must have, of the generation of the great African and S. American coasting C., the occurrence of endless streams of circulating water, and the existence of the Austral C. Other causes, of course, may be at work, yet the great *general* cause is probably the effect of aerial C., which arise from differences of temperature and pressure. The rush of waters out of the estuary of some large river may be felt for hundreds of miles out to sea; differences of salinity and temperature may also give rise to ocean movements; but it seems impossible that such causes could produce streams so constant in direction and rate of flow, so river-like in their comparative narrowness, and so easy of recognition, as these O. C. are. In 1844 Captain Maury, one of the first to show the importance of charting the various C., attempted to prove the existence of a general polar set of equatorial water, accompanied by a creep of polar water along the bottom towards the equator. His reasoning was based upon the lower temperature and less salinity of polar as compared with equatorial water. But if the assumption concerning the salinity be true, it would be physically impossible for polar water to descend below equatorial water, because of the necessarily less specific gravity of the former. Dr W. B. Carpenter, however, dropping the salinity point, has argued that there must be what he calls a *vertical* circulation of the nature above mentioned, because the sinking of the heavy polar surface-water, due to its low temperature, must be accompanied by a surface influx of a specifically lighter water, which therefore must come originally from the equator. The equilibrium is restored by the flow of the cold polar waters along the ocean-bed towards the equator. Owing to the greater velocity of rotation at the equator than at higher latitudes, this surface-set must gradually shoot ahead of the earth, and therefore have a general motion to the N.E. or S.E., according as the flux is towards the N. or S. pole; and the respective return under-surface flows must be directed towards the S.W. and N.W. Sufficient investigation has not yet been made to test the truth of this theory, though Professor Wyville Thomson finds no evidence in its favour from his recent *Challenger* expedition.

The best current-charts are those of the Admiralty, that in W. and A. K. Johnston's *Physical Geography*, the one in Stieler's *Hand Atlas*, and those in Maury's *Physical Geography of the Seas*.

Curr'ie, James, M.D., the biographer and editor of Burns, was born in Dumfries-shire, May 31, 1756, studied medicine at Edinburgh, and settled as a practitioner in Liverpool in 1781. He died at Sidmouth, August 31, 1805. His edition of Burns realised £1400 for the benefit of the widow. A professional work, *Medical Reports on the Effects of Water as a Remedy in Febrile Disease* (1797), showed that his views on this subject were in advance of the time.

Curr'ycomb, an iron comb for currying or dressing down horses. It is made up of several notched plates fastened to an iron back parallel to each other.

Curr'ying. See Leather.

Curr'y Pow'der, a condiment of East Indian origin, very extensively employed in Oriental food, and at the same time a favourite stimulant relish in European countries. It is a very complex preparation, the leading ingredient being turmeric powder, to which are added ground corianders and black pepper, with occasionally cardamoms, cayenne, cummin, fenugreek, &c.

Cur'sing and Swear'ing. See Swearing.

Cursing, Letters of. Previous to the Reformation letters of excommunication by the Church were termed L. of C.

Curso'res, the order of Running birds represented by the *Struthionidæ* or ostriches, rheas, emeus, and cassowaries, and the *Apterygidæ* or New Zealand *Apteryx* (q. v.). This order is distinguished by the flat nature of the breastbone or sternum, by the rudimentary wings, by the length of limbs, and by their muscularity, adapting them for running. The hinder toe is wanting in all but *Apteryx*; the ostriches have two toes only, while the others have three toes. The claws are blunt nails, and the under surfaces of the toes are broadened to form soles in running. The barbs of the feathers are unconnected and loose. The pelvis (as in the ostriches) is unusually strong and firm, and in these latter birds the pubic bones unite to form a *symphysis*—a conformation seen in no other bird. The C. correspond to Huxley's division *Ratitæ*, or those birds with flat shield-like breastbones.

Cur'tain. See Fortification.

Cur'tilage, a legal term in England for a courtyard or piece of ground lying near and belonging to a dwelling-house.

Cur'tis, George William, author and editor, was born in Providence, Rhode Island, February 24, 1824. In 1842 he

joined the once-famous 'Brook Farm Association,' and went through that curious phase of existence for eighteen months. He then proceeded to Concord, the home of Emerson and of the transcendental philosophy of New England, visited Europe in 1846, and returned to America in 1850. C. was then employed on the staff of the *New York Tribune*, and wrote the *Lotus Eating* (1851); became editor of *Putnam's Monthly;* and since 1853 has been a popular Lyceum lecturer. For a long time he has edited *Harper's Weekly* and *Harper's Monthly.* Among his other works may be mentioned *Potiphar Papers, Howadji in Syria,* and *Prue and I.*

Curtis'ia, a genus of *Cornaceæ* (q. v.). *C. faginea* of S. Africa furnishes the wood from which the natives make their spear or *assagay shafts;* hence the tree is usually called Assagay-tree or Hassagay-wood.

Cur'tius, Ernst, a German antiquary and philologer, was born at Lubeck, September 2, 1814. He studied philology at Bonn, Gottingen, and Berlin, was appointed professor at Berlin in 1844, and also, in the same year, tutor to Friedrich-Wilhelm, Crown-Prince of Prussia. In 1856 C. accepted the Professorship of Philology and Archæology at Gottingen, a post he held till 1865, when he was removed to a similar chair at Berlin. He has been since 1853 a member of the Academy of Science at Berlin, and since 1870 director-general of the museums of the same city. C.'s principal works are, *Anecdota Delphica* (Berl. 1843); *Inscriptiones Atticæ Duodecim* (Berl. 1843); *Die Akropolis von Athen* (Berl. 1844); *Peloponnesos* (Gotha, 1851 52), a scientific and pictorial delineation of the Greek Peninsula, embracing its history, legends, and monuments of art; *Die Ionier vor der Ionischen Wanderung* (Berl. 1855); *Zur Geschichte des Wegebaues bei den Griechen* (Berl. 1855); *Abhandlung uber Griech. Quell- und Brunneninschriften* (Gott. 1859); *Griech. Geschichte* (3d ed. Berl. 1869), translated into English by A. W. Ward, 1868–70). Other works of C. are *Attische Studien* (Gott. 1863-64); *Gottinger Festreden* (Berl. 1864); *Sieben Karten zur Topographie von Attica* (1868); *Die Knieenden Figuren der Altgriech. Kunst* (Berl. 1870); *Der Geburtstag des Deutschen Kaisers.*—**Georg C.**, brother of the preceding, also a famous philologer, was born at Lubeck, April 16, 1820. He studied philology at Berlin and Bonn, and gained his degree of doctor at Berlin in 1842, by an essay *De Nominum Græcorum Formatione.* He was subsequently professor at Dresden, Berlin, Prague, and Kiel, till in 1862 he was appointed Professor of Classical Philology and joint-director of the classical seminary at the University of Leipsic. C.'s principal works are *Die Sprachvergleichung in ihrem Verhältniss zur Classischen Philologie* (Dresd. 1845, 2d ed. 1848); *Sprachvergleichende Beiträge zur Griech. und Lat. Grammatik* (Berl. 1846); *Grundzuge der Griech. Etymologie* (Leips. 1858–62); *Griech. Schulgrammatik* (Prag. 1852, 9th ed. 1870); *Erlauterungen* (Prag. 1864, 2d ed. 1870); *Studien zur Griech. und Lat. Grammatik* (vols. i.–iii Leips. 1868–71).

Curtius, Mettus or **Metius**, according to Roman legend, was a noble youth who, when the Forum had opened in 362 B.C., and the soothsayers had declared that the chasm could only be filled by throwing into it the most valuable possession of the state, exclaimed that the greatest wealth of the state was a brave citizen in arms, and mounting his horse in full armour, leapt into the chasm, which immediately closed over him.

Curtius, Rufus Quintus, a Roman historian, author of the very inaccurate work *De Rebus Gestis Alexandri Magni,* is supposed to have lived in the time of Vespasian. The first two books of the ten of which the work originally consisted have been lost, and there are numerous gaps in the remaining eight. The first edition was printed at Venice, probably about 1471, and among the best modern ones are those of J. Mützell (Berl. 1841) and of Zumpt (Bruns. 1849; 2d ed. 1864). Investigations as to his age have been published by Niebuhr, Buttmann, and G. Pinzger.

Cur'vature of a plane curve is the rate of change of direction per unit of length of a point supposed to be moving uniformly along the curve. It is thus seen that the C. of a circle is the same at every point, and that it varies inversely as the radius—the less the C., the larger the circle. Take any three consecutive points on the curve, and let the length of the arc between the first and third be δs, and the angle between the tangents at these two points $\delta\theta$. If the arc be very small, it may be treated as a part of a circle, when $\delta\theta$ may be taken to represent the angle between the radii of C. Hence we have ultimately, as δs is taken smaller and smaller, $r\delta\theta = \delta s$; and, therefore, taking the limit, the C. is $\frac{d\theta}{ds} = \frac{1}{r}$, where r is the radius of C. The method commonly employed for obtaining an expression for r at any point, is to find the circle which has contact of the first and second order with the curve at that point. A curved line not confined to one plane is called a curve of double C.

Curve, as defined by Euclid, is a line no part of which is straight. In analytical geometry, however, there must be some definite relation between its Co-ordinates (q. v.) which is expressible by an equation. Curves whose equations contain only powers of the co-ordinates are termed *algebraic;* but if other functions, such as sines, tangents, logarithms, enter, they are called *transcendental* curves. Curves are classified according to the *number* representing the highest power of the co-ordinates. The straight line is of the first order; the conic sections are of the second, and are called quadrics; the cissoid and witch are of the third order, or cubics; and the conchoid and cardioid are of the fourth, or quartics. For many curious properties of some of these higher curves, see Salmon's *Higher Plane Curves.*

Curves, Anticlinal and Synclinal, are geological terms applied to the ridges and troughs of undulating strata. The former are indicated by the same series of strata dipping away on both sides from an imaginary line parallel to ridges, and the latter by the same series dipping towards a corresponding line from both sides of it. Thus a valley may be, and very commonly is, really an anticlinal curve; and these C. often occur in continual succession over a plane area, so that the physical configuration of a district can be no indication of the geological structure. The imaginary lines about which the beds may be supposed to be bent are termed respectively the *anticlinal* and *synclinal axes.* Very perfect examples of these C. are found in the Swiss Jura.

Cur'wen, the Rev. John, founder of the Tonic Sol-fa method of teaching music, was born at Heckmondwike, Yorkshire, in 1816, and educated at Coward College and University College, London. He became an Independent minister in 1838, and a few years afterwards his attention was called to the subject of teaching children music in connection with his Sunday-school. In 1841 he visited Miss Glover's school at Norwich, and afterwards tried her system with some success. His own notation and system (see TONIC SOL-FA SYSTEM) he developed gradually from this time, without any idea at first of the revolution it would effect in the musical education of the country. C. became pastor of the Congregational church at Plaistow, Essex, in 1844, and retained his charge until failing health and the growing cares of his musical work, which he felt it his duty to carry on, compelled him to resign it in 1865. He is now (1876) President of the Tonic Sol-fa College, an institution founded by him in 1862 to grant certificates of proficiency in music and promote musical culture. C. devotes most of his time to the duties of this office, to the publication of the *Tonic Sol-fa Reporter,* and to spreading the knowledge and love of music among the people.

His works include a *Grammar of Vocal Music,* a number of courses of lessons and exercises in choral singing adapted to different classes, a book on analytical harmony, *How to Observe Harmony, Commonplaces of Music, Lectures on Psalmody,* &c.

Curzo'la (anc. *Corcyra Nigra,* from its dark pine forests; Slav. *Karkar*), a beautiful island in the Adriatic, off the coast of Dalmatia. It is 25 miles long, with an average breadth of 4 miles; area, 68 sq. miles; pop. 6500, many of whom are engaged in the coast-fisheries. C. is still for the most part covered with wood, the pine attaining a great size and yielding excellent ship-timber. There is a town of the same name in the N.E. corner of the island with a pop. of 2000.

Cus'cus. See LEMON-GRASS.

Cuscuta'ceæ, the Dodder order, a natural order of corolli-floral Dicotyledons, considered by some as a sub-order of *Convolvulaceæ,* consisting of leafless parasitic climbing plants. There are about fifty species, included under four genera, chiefly natives

of temperate climates. They possess acrid and purgative properties, and are often destructive to flax, clover, and other crops round which they climb. After the suckers get attached to the stem of the plant on which it is climbing, the dodder separates its connection with the soil. See DODDER.

Cush'at Dove. See PIGEON.

Cusp (Lat. *cuspis*, 'a point'), in geometry, is a stationary point of a curve, at which there are two branches with a common tangent. When the branches are both on the same side of the tangent, the C. is *ramphoid*; when on opposite sides, *seratoid*.

Cuss'o, or Kouss'o, the flowers and tops of *Brayera anthelmintica*, a tree about 20 feet high, a native of Abyssinia. It belongs to the *Rosaceæ*. C. is used in medicine in doses of a quarter to half an ounce, given as an infusion to destroy tapeworms. It was introduced into Europe about the middle of the present century.

Cus'tard (Cymr. *cwstard*, from *caws*, 'cheese' or 'curd;' comp. Lat. *caseus*), a kind of pudding prepared from milk and eggs well whipped up together, and allowed to *set* by the application of heat. The dish is flavoured by the addition of aromatic essences, such as lemon-peel, orange-peel, almond, nutmegs, &c. It is highly digestible and nutritious, and as it takes the most delicate flavours, it can be rendered exceedingly pleasant.

Custard-Apple, the name given to the fruits of various species of *Anona*, S. American and W. Indian shrubs and trees, types of the order *Anonaceæ*. Several are cultivated for the sake of their fruits. The sour-sop of the W. Indies, which often weighs 2 lbs., and has an agreeable acidulous flavour, is the fruit of *A. muricata*. The sweet-sop (*A. squamosa*) is a native of the Malay Islands, but is now extensively cultivated in the W. Indies. Its luscious pulp is esteemed by some tastes, and the seeds contain an acrid principle fatal to insects, on which account the natives of India use them powdered and mixed with the flour of the gram (*Cicer arietinum*) as a wash for the hair (Royle). The cherimoyer (*A. Cherimolia*) is considered by the Peruvians as the most delicious fruit in the world. The common C.-A., or bullock's heart (*A. reticulata*), is a native of the W. Indies, but is cultivated in the E. Indies and other tropical countries; it is not so much valued as the other fruits of the genus. The C.-A. is also valued for its fragrant leaves and aromatic woods. The wood of the alligator-apple (*A. palustris*) is used in place of cork; the fruit has a pleasant taste, but is dangerous to eat on account of its narcotic properties. The N. American C.-A. is *Asimina triloba*.

Cus'tody. See IMPRISONMENT.

Cus'tom. In law, the word is applied to general or local usage. In the former case it falls to be determined by a judge, in the latter by a jury. When the right of an individual arises from usage, it is not called C., but Prescription (q. v.). Uniform C. has almost the same legal effect as statute. See COMMON LAW.

Cus'tomary Freehold is, in English law, a kind of tenure of estate practically the same as Copyhold (q. v.).

Customs Duties are duties levied on commodities exported or imported. They were first authorised by statute in the 3d Edward I., and the mode long employed in their collection was to fix a certain rate of value on each kind of merchandise, and to grant on these rates a subsidy, generally of 1s. per £1 of value in the book of rates. The present book of rates was formed in 1692, and in connection with official valuation has been useful in denoting the comparative *quantities* of commodities passing through the customs, but not their *real* or *declared* value. The Customs' Consolidation Act of 1853 is a complete embodiment of the law regarding the customs. Importation of the following articles is prohibited under penalty of forfeiture or destruction of the commodity:—Copyright books, extracts or essences of coffee, chicory, tea, or tobacco, immoral books, prints, and similar articles.

Persons may be searched, and severe penalties are enacted against any endeavour to contravene or evade the law. Offering to bribe or reward a customhouse officer is prohibited under a penalty of £200.

The British revenue for the year ending 31st March 1873 was £76,608,770, of which there was derived from customs £21,033,000.

Legislation regarding customs has various and formidable difficulties to contend with. In the first place, while the exigencies of the Public Revenue (q. v.) make it impossible to dispense with customs, the principles of Free Trade (q. v.) must, in imposing them, be as little contravened as is consistent with that exigence. Then the duty must not be raised to a height which will discourage lawful importation, and make smuggling remunerative. To do this is a double evil—it causes loss to the revenue, and demoralises the people. See BONDED WAREHOUSE.

Cus'tomhouse is the office at a seaport—or abroad at a frontier or seaport—where the Customs Duties (q. v.) are levied. The collection and management of the customs of the United Kingdom and of the British possessions abroad are under the control of a board of commissioners. They are appointed by the crown, and are under the authority of the Lords of the Treasury.

Cus'tos Rotulo'rum, the keeper of the rolls or records of the county in England. The office does not now exist in Scotland.

Cus'trin. See KÜSTRIN.

Cutch. See KUTCH.

Cuth'bert, a monk of Jarrow, who wrote the letter containing a graphic and touching account of the death of the Venerable Bede. C. had been a disciple of Bede, and became afterwards Abbot of Jarrow. His letter is printed in Stevenson's edition of the *Historia Ecclesiastica* of Bede (Lond. 1838). The English reader will find it in Bohn's translation, edited by Dr Giles.

Cuthbert of Canterbury, a Mercian bishop, obtained the see of Hereford in 736, became Archbishop of Canterbury in 740, and died in 758. He is memorable as the author of a letter to St Boniface (q. v.) dealing with Church corruptions, which is reprinted in Hussey's edition of Bede's *Historia Ecclesiastica* (Oxon. 1846).

Cuthbert, St, of Durham, the Apostle of Northumbria, was born about 635. He was a native of Bernicia, that district lying between the Tweed and Tees, and passed his boyhood at the little lowland village of Wrangholm, on the southern edge of the Lammermoors. The early years of C. gave his character a distinctive bent. He was a shepherd—a seer of visions, as shepherds have been in all ages. As he tended his flock by night, the heavens seemed to open above him, and a crowd of bright angels winged upwards, bearing the soul of St Aidan to glory. This wonder befell him in his fifteenth year; a nature like his, fervid and simple, was impressed profoundly, and he must become a monk. C. accordingly entered the monastery of Melrose, an offshoot from the older house at Lindisfarne. The youth, however, was no dreaming visionary, but an earnest worker. The semi-heathen people that surrounded him woke his missionary ardour, and he ministered for years among the Northumbrians with equal patience and zeal. Leaving Melrose, he shifted his sphere of labour southward. The Council of Whitby, by its decision that Roman ecclesiastical rule should be adopted by the English Church, caused bitter dissensions in the religious houses. Wearied with these strifes, C., who had become Prior of Lindisfarne, withdrew in 676 to a barren islet off the Northumbrian coast. Building with his own hands a rude hut of turf and driftwood, he wished to end his days as a hermit on this lonely rock. His former career had been one of active effort in spreading his faith, and now he felt that his closing span would best be given up to meditation and prayer. But the fame of his sanctity did not allow C.'s recluse life to continue. Ecgfrith, king of the Northumbrian English, was an ambitious monarch, warring against the Pictish Britons of the N. The presence in his dominion of a man so saintly as C. would certainly bring success, therefore he besought him to return. Bishop Trumwine, whom the Picts had driven from his see, added his entreaties. The venerable saint consented reluctantly, and in 684 again became Bishop of Lindisfarne. Next year King Ecgfrith marched against the Picts, and was defeated and slain at Nechtansmere. C. was said to have foreseen and foretold the disaster. He resigned his bishopric in 687, and retired to the island where he had lived as an anchorite. There he died two months after. A monk of Lindisfarne saw from the watch-tower

of his monastery a light on the lonely islet of St C., which was the appointed signal that the old man was no more. His remains were taken to Lindisfarne, and being found incorrupt at the end of eleven years, the belief arose that so they would continue. Danish attacks forced the monks to bear their precious relic inland, and in 945 it was taken to Durham, where it was thought to work many miracles. After the Reformation the coffin was buried under the cathedral pavement, and remained there till 1827, when it was opened, and the bones of the saint were found. The character of St C. resembles strongly that of Columba, only that the former was more of an ascetic. Both were evangelists of an eminently practical nature; neither was distinguished for scholarship or erudition. St C. was a spiritual enthusiast, and yet a man of strong, firm mind. The union of these qualities gave him his great influence over his countrymen. The reverence bestowed on him in lifetime lasted for generations after he was gone. The Church held as a festival the anniversary of his death, and a cloth which he was said to have used in celebrating mass was carried as a standard by English armies. St Edmund, St Thomas-à-Becket, and St C., rank together as the three foremost saints of the mediæval English Church.

None of the early English ecclesiastics have had so much light thrown upon their lives, both by contemporary records and by later investigation, as St C. Bede has left an account of him both in verse (*Liber de Miraculis Sancti Cuthberchti Episcopi*) and in prose (*Liber de Vita et Miraculis Sancti Cuthberchti Lindisfarnensis Episcopi*). There is also a *Historia Translationis Sancti Cuthberti* preserved in the *Acta Sanctorum*, vol. iii., and two works, one a *Life* the other an account of his miracles, by Reginald of Durham. More recent biographies are those of Raine (*St C.*, Durh. 1828) and of Eyre (*History of St C.*, Lond. 1849). An interesting sketch of St C. is given in Green's *Short History of the English People* (1875).

Cu'ticle (Lat. *cuticula*, dim of *cutis*, 'the skin'). the epidermis or uppermost layer of the skin. It is composed of layers of epidermic cells, which become more and more flattened from the surface of the true skin outwards, until on the surface they form hard dry scales. See SKIN.

Cutis Vera, the true skin, covered by the epidermis, and resting on close connective tissue, in the meshes of which there are often numerous fat cells. See SKIN.

Cut'lass (Fr. *coutelas*, Old Fr. *coultelas*, from Lat. *cultellus*, dim. of *culter*, 'a knife'), a broadsword used by sailors in hand-to-hand encounters. It is about three feet long, is very heavy, and has only one cutting edge.

Cut'lery (Fr. *coutellerie*, from *couteau*; Old Fr. *coutel* and *coltel*; Lat. *cultellus*, dim. of *culter*, 'a knife'), a term under which is included cutting instruments such as pocket and table knives, forks, scissors, razors, scythes, sickles, and machine knives generally. The cutting instruments which were used by the primitive inhabitants of the world, before metallurgical operations were understood, consisted of sharp-edged flakes of flint or other hard stone, which they fashioned with wonderful neatness. Remains of such flint-knives are very abundant. Cutting implements of iron or steel were not fabricated till after a kind of bronze had been long used for the making of knives and all other metallic implements. From very remote times the manufacture of C. has been identified with the town of Sheffield, and it to the present day stands at the head of all centres of this industry. Its fame was widespread even in the days of Chaucer, who mentions its peculiar manufacture—

'A Shefelde thwittle bare he in his hose'

The processes through which a piece of C., such as, for example, a razor, has to pass, are very numerous, when we consider the low price at which such articles are sold A razor, selling with case complete for one shilling, has to undergo the following series of operations:—A piece of rolled cast-steel sufficient for the blade is cut off a rod. It is heated and hammered into the rough form of the razor, in which state it is called 'the mould.' The 'tang' is next hammered into shape, and a hole pierced in it for riveting the blade into the scales. It is thereafter 'smithed'—*i.e.*, heated and hammered—into proper shape, and the name and mark of the maker is stamped on it. Next the blade is hardened by heating and sudden plunging into cold water; it is ground at the tip, the back is rounded, the tang finished with the file, and a file-surface given to the inside of the tang. It is then ground on a grindstone, and polished on a wheel covered with buff leather, when it is ready for putting into the scales. The scales of cheap razors are made of horn-tips, which are first shaved and scraped, and next moulded into shape by heat and pressure in moulds of the proper form. These are thereafter polished on the buffing-wheel; the blade is riveted in, and the razor is thus complete. Table-knives go through an analogous series of processes, but there are many different ways of forming and fastening the tang into the handles. In the making of steel forks, a 'web' of steel is beaten out of the required breadth and thickness, and by a powerful stamping-press the prongs are stamped in this web. The piece is then annealed and the prongs cut out of the stamped web. After grinding and pointing, the prongs are opened out, filed, and smoothed. They are then set into their proper position, hardened, ground on a dry stone, glazed, and burnished on a buffing-wheel, when they are ready for handling the same as knives. The tang in forks and knives is usually made of iron, which is welded on to the steel at an early stage of the process. Of recent years machinery has been adapted to the moulding of knives, &c., and in such cases steel is used for the tang as well as the blade. The dry grinding of C. is a peculiarly unhealthy occupation, owing to the particles of steel and silica settling on the lungs and originating 'grinder's asthma.' Many means have been tried to obviate this great evil, often much against the will of the grinders, who prefer short life and high pay to good health and fair wages. The most efficient preventive has been found to be a powerful blast created by fans, drawing away the minute particles by a channel having an opening over each grindstone Even with this amelioration, and with wet grinding itself, the occupation of grinders remains unhealthy, and the average duration of their lives is much under that of men employed in ordinary healthy trades.

Law as to Cutlery.—By 59 Geo. III. c. 7, articles of C. manufactured with a hammer may be stamped with the *figure of a hammer*, any time after the forging, and previous to the grinding or polishing. Using such device on C. not made with the hammer subjects it to forfeiture, and any one having it is liable to a penalty of £5. Any one stamping on C. the word *London* or *London made*, or words of similar import, unless the article is made in London or within 20 miles of it, or having an article so stamped, is liable to a penalty of £10, with forfeiture of the article.

Cuttack' ('royal residence'), the capital of an executive district of the same name, Orissa division, province of Bengal, India, at the beginning of the Mahanadi delta, 230 miles S.W. of Calcutta. It has little trade, its natural commercial advantages being neutralised by the periodic flooding of the river, to guard against which it is banked round. C. is connected with Calcutta by an irrigation canal. Pop. (1871) 50,878. Orissa College is here. The *district* is subject to the same vicissitudes as the town, has little trade, but contains iron ore. Area, 3178 sq. miles; pop. (1871) 1,494,784. The other chief towns are Jajpore (10,753) and Kindrapara (10,682).

Cutt'er (so called from its *cutting* the water in its swift motion) is a small sailing vessel having one mast and is rigged like a Sloop (q. v.). In the navy, a C. is a large Clinker-built (q. v.) boat, of which every man-of-war has at least two.


Cutter.

Cutt'ings are portions of the branches of trees and shrubs inserted into the ground, and which, by sending forth adventitious Roots (q. v.) from the stem, enable the cutting to take root in the ground, and produce a tree or shrub the same as that from which it was taken. It is essential to success that a bud should be left on the cutting, and that the bark should not be stripped off in pushing it into the soil.

Cutt'lefish, the name applied popularly to any member of the Molluscan class *Cephalopoda* (q. v.), in which the body is enclosed in a muscular mantle-sac, the gills being two or four in number, and the effete water of respiration being ejected by an *infundibulum* or 'funnel.' Cuttlefishes are divided into the four-gilled, or *Tetrabranchiate*, and *Dibranchiate*, or two-gilled forms. Of the four-gilled forms, the Pearly Nautilus (*Nautilus Pompilius*), with its numerous arms, destitute of suckers, its external many-chambered shell, and its want of an ink-sac, is the only living example. The latter group includes all other living cuttlefishes together with the extinct *Belemnites* (q. v.). The *Ammonites* (q. v.) and allied forms are extinct cuttlefishes belonging to the Tetrabranchiate section. Gigantic cuttlefishes have been met with of late off the Irish and N. American coast. The shell in two-gilled cuttlefishes is internal, and exists as the 'pen' or 'cuttle-bone.' In the Argonaut or paper-nautilus (*A. argo*), the shell is external, but it is not a true shell, being secreted by two of the arms, and not by the *Mantle* (q. v.). The two-gilled cuttlefishes are able to seize prey by means of the numerous *acetabula* or suckers with which their arms are provided.


Cuttlefish.

Cu'vier, Georges Chrétien Léopold Dagobert, was born at Montbeliard, 23d August 1769, where his father had retired after serving with distinction in the French army of the Seven Years' War. His taste for natural history is said to have been first excited by a copy of *Buffon*, the illustrations of which he was copying. By the kindness of the Wurtemberg family he obtained a university education at Stuttgart, where he studied natural science in the *Cameralwissenchaft*, or Administrative Science Department of the Academia Carolina. An engagement as tutor in a noble French family living on the coast of Normandy, where he remained from 1788 to 1794, gave C. an opportunity for personal observation of marine animals, which led him to the systematic study of anatomy. A correspondence with Geoffroy St Hilaire drew C. to Paris, where he made the acquaintance of such men as Lamarck, Jussieu, &c., and was appointed a member of the Commission of Arts and Professor at the Central School of the Panthéon. From this he became Professor of Comparative Anatomy at the Museum, then at the Collége de France, then at the Jardin des Plantes. He also lectured at the Athenæum. C. and St Hilaire produced together the celebrated *Mémoires sur une Nouvelle Division des Mammifères*, and several others, in which the Linnæan classes of *insecta* and *vermes* were divided into molluscs, insects, vermes, echinoderms, and zoophytes; molluscs being subdivided into cephalopods, gasteropods, and acephala. C.'s celebrated *Leçons d'Anatomie Comparée*, delivered at the Muséum, contain the theory of a rational harmony between different organs and their functions, leading to a division into four great types, which was afterwards fully developed in the *Règne Animal distribué d'après son Organisation*, published in 1816. Special lines of inquiry were directed to the systems of digestion and circulation in molluscs, and to fossil remains generally. Especially in the latter inquiry his theory of rational harmonies was of use in filling up the connections between isolated remains, as in his determination of the species of elephants from observation of the teeth and lower jaw and of a drawing of the skulls; also in his classification of the fossil remains of Montmartre. Important services were thus rendered to palæontology and geology, C. and Brongniart making a joint study of the geological conditions of animal life, which the former summed up in his *Recherches sur les Ossemens Fossiles* (1812), to which his *Discours sur les Révolutions du Globe* is an introduction. The *Règne Animal* was intended to furnish not only the outlines of a true classification, but to apply principles so established to all existing groups: the latter design was partly carried out in the *Histoire Naturelle des Poissons*, a work in which C. was assisted by Valenciennes, and in which above 5000 species of fish are described. In the meantime public honours flowed in upon him. He became perpetual secretary to the Institute for the Department of Natural Sciences, an inspector-general for establishing the well-known French *Lycées* or public schools; he drew up the report of 1808 upon Natural Sciences; he was sent on important educational missions to Italy, Holland, and the Hanseatic towns. Before the abdication of Napoleon he was made a councillor of state, and under the Restoration monarchies he held high posts in the bureaux of Education and Public Worship, and as President of the Committee of the Interior for the last thirteen years of his life he effected many useful reforms in the teaching institutions of France. After the Revolution of July he was made a peer. He died 13th May 1832. In politics C. occupied the position of a moderate Liberal. The closing years of his life were marked by a keen controversy with St Hilaire, who maintained that real analogies existed even between molluscs and vertebrates, and also that species were variable. See Lee's *Memoires of Baron C.* (Lond. 1833), and Pasquet's *Éloge de C.* (Par. 1833).

Cuxha'ven, or **Kuxhaven**, a town of N. Germany, in the amt of Ritzebuttel, belonging to Hamburg, is situated at the mouth of the Elbe, on its left bank, 65 miles N.W. of Hamburg by railway. It has a good harbour, a lighthouse, bathing establishments, and is the port from which the Hamburg steamers ply in winter when the Elbe is frozen over. Pop. (1872) 3810. In and near C. are five strong forts.

Cuya'ba, the capital of the province of Matto Grasso, Brazil, on a river of the same name, a tributary of the Paraguay, is a naval and military arsenal, has several churches, an hospital, a theological school, &c., and some export trade in gold, diamonds, ipecacuanha, and hides. Pop. 7000.

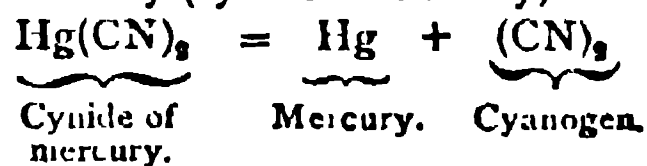
Cuyp or **Kuyp, Albert**, one of the most distinguished painters of the Dutch school, the son of Jacob or 'Old' C., a landscape and portrait painter, was born at Dordrecht in 1605. He painted landscapes with cattle, moonlights, winter pieces, canal scenes, &c., and all of them with splendid success. De Waagen says of him—'In elevation of conception, knowledge of aerial perspective, with the greatest glow and warmth of the serene atmosphere, C. stands unrivalled, and may justly be called the Dutch Claude.' It is easy to distinguish in his pictures the time of day intended to be represented. The most ardent collectors of examples of C. have been Englishmen, and the majority of his works—which within the last century have wonderfully increased in value—are in English public and private collections. The precise date of his death, which took place after 1683, is unknown.—**Benjamin C.**, his nephew, painted historical *genre* pictures with much power.

Cuz'co (the 'navel' or 'centre'), the second town of Peru, formerly the seat of the Incas and capital of their empire, situated amid magnificent scenery in the valley of a lofty tableland, at the height of about 12,000 feet above sea-level, and at the distance of over 400 miles E.S.E. of Lima. Its valley is watered by the Guatanay, one of the extreme head-waters of the Amazon. The town, which is regular, is the seat of a bishop, of a so-called university and several schools, a museum founded in 1848, and two hospitals. Among the remains of the old Peruvian empire are the ruined walls of the temple of the sun and the ruins of the palace of the Incas at the foot of the hill of Sacsahuaman. Pop. 25,000, who produce excellent goldsmith's and lace work, carvings, and cotton and woollen cloth. Sugar-refining, soap-making, &c., are carried on. Agriculture is the chief employment, and the country around is as fertile as it is beautiful. The climate is agreeable and healthy. For an account of the wealth and magnificence of ancient C., see Prescott's *Conquest of Peru*, an authority, however, which certain recent writers have ventured to consider not quite trustworthy.

Cy'amus Balæna'rum. See WHALE-LOUSE.

Cyan'ic Acid, a liquid substance best obtained by distilling its polymer, Cyanuric Acid (q. v.). C. A. has a very pungent smell, recalling that of acetic acid, and exercises a corrosive action on the skin. When kept for a short time, it suddenly becomes a white crystalline mass of cyamelide. C. A. is a monobasic acid, having the composition expressed by the formula CN(OH), and forms crystalline salts in which its hydrogen is replaced by metals. When its vapour comes in contact with dry ammonia gas, a white crystalline powder, the cyanate of ammonium, is formed, which when boiled with water suffers a molecular change, and becomes converted into Urea (q. v.).

Cyan'ogen, a compound of carbon and nitrogen, was discovered in 1813 by Gay-Lussac. It is best obtained by heating its compound with mercury (cynide of mercury)—



$$\underbrace{Hg(CN)_2}_{\text{Cynide of mercury.}} = \underbrace{Hg}_{\text{Mercury.}} + \underbrace{(CN)_2}_{\text{Cyanogen.}}$$

C. is gaseous at ordinary temperatures, but may be condensed to a liquid by subjecting it to cold or pressure. It has an odour recalling that of bitter almonds, and burns when ignited with a very characteristic peach-coloured flame. It is soluble in water and alcohol. Its solutions, when kept, deposit a brown substance called Para-C., a body having the same percentage composition as C. itself, but probably polymeric with it. (See POLYMERISM.) C. is interesting as affording an excellent instance of a *compound radical* or group of elements behaving like a single element. In its chemical relations it closely resembles chlorine, as will be seen by an inspection of the following formulæ—

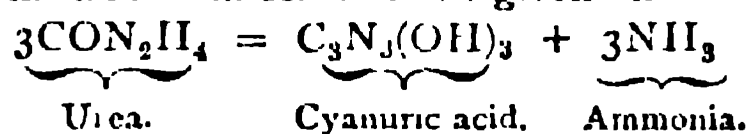
Free chlorine	Cl_2	Free cyanogen	$(CN)_2$
Hydrochloric acid	HCl	Hydrocyanic acid	$H(CN)$
Chloride of potassium	KCl	Cyanide of potassium	$K(CN)$
Chloride of mercury	$HgCl_2$	Cyanide of mercury	$Hg(CN)_2$
Hypochlorous acid	$Cl(OH)$	Cyanic acid	$CN(OH)$

See HYDROCYANIC ACID, POTASSIUM, &c.

Cyano'sis (Gr. 'blueness' or 'blue disease') is a condition in which there is a blue or purple colour of the skin, due to an admixture of venous and arterial blood, depending in most cases on a malformation of the heart. See HEART, MALFORMATION OF.

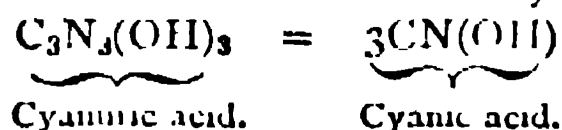
Cyan'otype, a photographic process discovered in 1842 by Sir John Herschell, in which sensitive paper is prepared by washing in a solution of citrate of ammonia and iron, and after exposure in the camera, the image is developed by means of a solution of ferrocyanide of potassium, which produces a violet-tinted picture. A solution of carbonate of sodium acts as a neutralising agent and fixes the image.

Cyanu'ric Acid is a white crystalline substance obtained by heating urea till ammonia ceases to be given off—



$$\underbrace{3CON_2H_4}_{\text{Urea.}} = \underbrace{C_3N_3(OH)_3}_{\text{Cyanuric acid.}} + \underbrace{3NH_3}_{\text{Ammonia.}}$$

C. is a *tribasic* acid, forming crystalline salts in which one, two, or three atoms of its hydrogen are replaced by metals. When strongly heated, C. becomes converted into Cyanic Acid (q. v.)—



$$\underbrace{C_3N_3(OH)_3}_{\text{Cyanuric acid.}} = \underbrace{3CN(OH)}_{\text{Cyanic acid.}}$$

Cyath'ea, a genus of tree ferns, abundant in S. America, the W. Indies, India, the Malay and Pacific Islands. Some are lofty, and cultivated in our conservatories and gardens. The pulp within the trunk of *C. medullaris* and *C. dealbata*, fine species of New Zealand and the Pacific Islands, is eaten by the natives of these countries.

Cyb'ele, a genus of Trilobites (q. v.) belonging to the family *Cheiruridæ*, in which the body segments number eleven, the caudal shield being composed of few segments. They are found as fossils in the rocks from the Upper Cambrian to the Devonian series, most plentifully in the Silurian system.

Cybele. See RHEA.

Cycada'ceæ, or **Cycadeæ** (*Cycads*), a natural order of Dicotyledonous, small, palm-like, unbranched trees or shrubs, allied to the *Coniferæ* (q. v.), natives chiefly of the temperate and tropical regions of America and Asia, and also of the Cape of Good Hope, Madagascar, and Australia. There are about fifty species and seven genera, of which *Cycas*, *Dion*, *Encephalartos*, and *Zamia* are the best known. The stems and seeds of the plants of most yield mucilage and starch—*e.g.*, inferior sago, prepared from the stems of *C. circinalis* (of the Moluccas) and *C. revoluta* (of Japan), the latter being known as Japan sago, though none of it is imported into Europe. The seeds are edible, and from those of *Dion edule* the Mexicans prepare arrowroot. *Encephartos* is Caffre-Bread (q. v.). Arrowroot is obtained from the stems of *Z. integrifolia*, of the Bahamas and other W. Indian islands, though not exported to Europe. Many species of cycas are found fossil in formations later than that of the Coal measures, such as the Oolite, &c.

Cy'chla, a genus of Teleostean fishes found in the rivers of S. America, and belonging to the family *Chromidæ*. The typical fishes of Brazil and Guiana belong to this genus. The teeth are minute, but closely set in the mouth, and the colours are very varied and brilliant. The genus *Chromis*, of which the *C. Niloticus* of the Nile is an example, is nearly allied to C. The chromis of the Nile is about two feet long.

Cy'clades. See ARCHIPELAGO and GREECE.

Cycla'men, a well-known and distinct genus of perennial herbs belonging to the natural order *Primulaceæ*, with beautiful flowers, heart-shaped leaves, and round, tuber-like root-stocks. Most of them are natives of the S. of Europe, though the genus extends to N. Africa and Western Asia. The fleshy root-stocks, though acrid, are eagerly sought after by swine; hence the plant is known in the popular language of various countries as 'sow-bread.' The root-stocks, especially of *C. hederæfolium*, are drastic and emmenagogue, and a stimulant ointment is prepared from them which, when applied externally by friction, is reputed a powerful vermifuge for children. The active principle of the genus is *cyclamine*, which acts on the animal system like Curarine (q. v.). Many of them are cultivated in our gardens as spring flowers.



Cyclamen Europæum.

Cy'cle (Gr. 'circle'), a name applied, chiefly in astronomy, to a period or interval of time, after the passing of which the same phenomena occur in the same order and circumstances as they did throughout the former period. Cycles are only approximately correct, since the periodic time of no known natural phenomenon is commensurable with our day. The more important articles are mentioned under the special headings GOLDEN NUMBER, INDICTION, METONIC CYCLE, PERIOD, &c.

Cyclobranchia'ta (Gr. 'circle-gilled'), a term sometimes used in the classification of Gasteropodous (q. v.) mollusca, and applied to those forms in which the gills are placed in a circular manner round the body, and generally between the 'Foot' and 'Mantle' (q. v.). The cyclobranchiate arrangement is well seen in the Limpets (q. v.) and Chitons (q. v.).

Cy'cloid (Gr. 'circle-like'), the curve generated by a point taken upon the circumference of a circle rolling along a given straight line. It has many interesting and curious properties, some of which are proved simply and neatly upon kinematical principles in Thomson and Tait's *Elements of Natural Philosophy*, part i. s. 104. Its evolute is an equal and similar C.; its area is three times that of the generating circle; it is the curve of swiftest descent from one point to another not in the same vertical line; and a heavy body sliding without friction down the arc of an inverted C., under the action of a constant force, will take exactly the same time to reach the lowest position, from whatever point of the curve it starts. Huyghens applied this property to obtain a perfectly isochronous pendulum.

Cycloid Fishes, or **Cycloi'dei**, and **Cycloid Scales**, the name applied to the commonest variety of fish-scales, seen in most of our familiar fishes (*e.g.*, salmon, herring, &c.), each scale consisting of a horny plate of more or less rounded form. The outline is smooth, or at most wavy. Agassiz called such fishes *Cycloidei*, but his arrangement has not been followed. Most Teleostean fishes, but not all, are *Cycloidei*.

Cyclope'an Ar'chitecture is the name given to walls of massive unhewn stones, because in ancient Greece such walls were fabled to have been built by the Cyclopes (q. v.). There are remains of these walls on the sites of Tiryns, Mycenæ, and other places in Greece, Asia Minor, Italy, and Sicily. They are built of huge, uncemented blocks, which are generally, as at Tiryns, of irregular polygonal shape, not fitted together, but having the gaps between them filled with small stones. Occasionally, as at Larissa, the stones are smooth and fitted into each

other. At Mycenæ the blocks are comparatively regular, and are arranged in horizontal lines. These structures are thought to be Pelasgian, but nothing certain is known of their origin. They are alluded to by Homer, who speaks of 'the walled Tiryns,' and 'the well-built Mycenæ.' The C. A. of the ancient Etrurian towns was probably Pelasgian. Parts of the C. A. of Cortona remain, one fragment being 120 feet high. The name C. A. can be extended to various structures in America and Asia, as to the walls of Cuzco in Peru, and to the ruins of the citadel of Persepolis. The *duns* or hill-forts of Britain are likewise specimens of C. A. See M. Petit-Radel's *Recherches sur les Monumens Cyclopéens.*

Cyclope'dia. See ENCYCLOPÆDIA.

Cyclo'pes (Gr. 'circular-eyed'), in Greek mythology, a gigantic race of shepherds, dwelling on the S.W. coast of Sicily, first mentioned in the *Odyssey* (ix.). They were cannibals. Their chief, Polyphemus, is described as having but one eye in his forehead. Hesiod mentions only three C.—Brontes ('Thunderer'), Steropes ('Lightning-Flasher'), and Arges ('the Bright' or 'Fiery'), also one-eyed, who were the sons of Uranus and Gæa, and forged thunderbolts for Zeus. For having provided him with that with which he slew Asclepius they were themselves killed by Apollo. Later they are represented as the servants of Hephæstus, with their workshop in Ætna. The C. to whom the walls known as Cyclopean are attributed (see CYCLOPEAN ARCHITECTURE) were considered by Plato as merely types of uncivilised man. Cox (*Manual of Mythology*) compares them to the Trolls or Frost-giants of Northern mythology.

Cyclo'pia, a genus of S. African shrubs of the order *Leguminosæ.* The leaflet of *C. genistoides*, a plant cultivated in our greenhouses, is called the 'bush tea,' from its agreeable tea-like smell. A decoction of it is used as an expectorant in chronic catarrh and consumption.

Cy'clops, one of the best-known 'water-fleas,' or Entomostracous Crustacea (q. v.), included in the order *Copepoda* of that class. The head and chest are protected by a carapace. The feet number five pairs. Each foot has divided extremities and is provided with hairs. The eye is single, and two pairs of antennæ exist. The females carry the eggs in two external *ovisacs.* A single congress with the male fertilises the female for life. The young pass through a metamorphosis. These forms occur plentifully in our fresh-water lakes and streams.

Cyclop'terus. See LUMP-SUCKER.

Cyclo'sis (Gr. 'circulation'), the movement of the latex or milky sap in the lactiferous, or milk-vessels, of various species of plants. The assertion that this movement is merely mechanical, from one part to another when the plant is injured and the juice is allowed to escape, is, in all likelihood, erroneous, for the movement can be well seen if the under surface of the leaf of Celandine (q. v.), the bracts of the common bindweed, the lower surface of the split stipules of the India-rubber plant, &c., be put under the microscope, and a strong reflected sunlight be thrown on it. The movement is sometimes very rapid, at other times slower; and the direction of the circulation can be changed at will by the interception of the sunlight. It is not the result of evaporation. (Brown's *Manual*, p. 44.)

Cydo'nia. See QUINCE.

Cyg'net, the name given to young swans.

Cyg'nus. See SWAN.

Cygnus, a northern constellation, one of whose stars, Deneb, forms with Vega and Polaris a brilliant right-angled triangle.

Cyl'inder (Gr. 'a roller'), the general name for a surface generated by a straight line moving parallel to itself. The sections by a series of parallel planes are similar and equal. If the section by a plane perpendicular to the generator be an ellipse, then there will be two different series of parallel planes, whose sections are circles. These are termed the *sub-contrary* sections. When the perpendicular section is a circle, we have the *right C.* of Euclid.

Cylinder Axis. See NAVE.

Cy'ma (Gr. *kuma*, 'a wave'), in architecture, a wavy-lined moulding, consisting of a hollow and a round. The *C. recta* has the hollow above the round; the *C. reversa* has the round above the hollow. They are called *ogees.*

Cym'bal (Gr. *kumbalon*, from *kumbē*, 'the hollow' of any vessel), a musical instrument of percussion, consisting of two metal plates which can be struck against each other. The C. is of very great antiquity.

Cy'me. See INFLORESCENCE.

Cym'ophane (Gr. *kuma*, 'a wave,' and *phainō*, 'I appear'), a variety of Chrysoberyl (q. v.), which shows a milky opalescence or 'wave of light,' and is much prized, when cut *en cabochon*, by jewellers, who call it *opalescent chrysolite.*

Cym'ric, or Kym'ric, Language and Literature. The Cymric, as well as the Gaelic branch of the Celtic language, shows the peculiar characteristic, the *differentia*, of the Celtic—*i.e.*, changes on the beginning as well as on the ending of its words; but though these changes differ so much in each of the dialects into which Cymric is subdivided as to warrant their being classed separately, the general resemblance of the laws which regulate them is sufficiently strong to prove them all to be of one family. See Rhys's *Lectures on Welsh Philology* (Lond. 1877).

The Cymric is divided into three branches—Welsh proper, Cornish, and Breton or Armoric. The English public knew almost nothing of any literature contained in these languages until Edward Lhuyd, an accomplished scholar, published in 1707 his *Archæologia Britannica*, showing that in Welsh many ancient treasures were preserved. His work excited very little attention at the time. In 1764 the Rev. Evan Evans, and twenty years later E. Jones, Esq., published specimens of the old poems of Wales, accompanied with English translations. Two Scotchmen, Laing and Pinkerton, who had taken a very prominent part in denouncing the Gaelic Ossian as a forgery, denounced the Welsh bards in the same style, and were listened to, although they were profoundly ignorant both of Gaelic and of Welsh. Sharon Turner answered them with considerable ability in his *Vindication of the Genuineness of Ancient British Poems* (1803). In 1801 Owen Jones, a native of Myvyr, in Wales, who devoted much time and money to the illustrating of his country's literature, published a collection of great extent and value under the title of *The Myvyrian Archæology of Wales.* Two accomplished writers, Mr Stephens (*Literature of the Kymry*, 1840), and Mr Nash (*Taliesin, the Bards and Druids of Britain*, 1858), laboured hard to prove that the great majority of poems published by him are spurious, while they admitted a few to be genuine and ancient. The question, however, has been conclusively disposed of by Mr W. F. Skene, who in 1868 published the *Four Ancient Books of Wales*, with a translation and a learned and exhaustive dissertation. He assigns the poems ascribed to the four great bards, Taliesin, Aneurin, Llywarch Hen, and Myrddin, to the 7th c., and considers that they were written down at various periods from the 12th to the 15th centuries. There are no traces of poetic composition from the 7th to the 12th centuries preserved, but during the next two centuries great literary activity manifested itself both in N. and S. Wales, and the writings of no fewer than seventy-six authors are handed down in circumstances which forbid any question of their genuineness.

It is worthy of remark that, in the old poems, Arthur (q. v.) is spoken of without romance or extravagance as the Guledig, or war-leader, who fought many successful battles against the enemies of his country, while in the later ones the popular romances concerning him are found full-blown. Much of the Welsh literature is of great historical value, and the Welsh deserve praise beyond any of their Celtic cousins elsewhere for still publishing newspapers and periodicals in their native tongue.

Little need be said of the Cornish dialect of the Cymric. It was spoken in Cornwall until after the middle of last century. The English has, however, entirely displaced it, and it is chiefly through the *Archæologica Cornu-Britannica* of Dr Pryce, published in 1790, that a knowledge of it must now be sought.

The Armoric or Breton is still spoken by a numerous people in the N. of France, and is much better known. See *Breton Literature* under BRETAGNE.

Cynan'che (Gr. *kuon* 'a dog,' and *ancho*, 'I strangle'), an inflammatory disease of the throat. See THROAT, DISEASES OF.

Cynan'chum, a genus of S. American, Malayan, and Mediterranean herbs belonging to the natural order *Asclepiadaceæ.*

Montpellier, or French scammony, a violent purgative, is in the juice of *C. Monspeliacum* mixed with other purgative substances; and the sap of *C. ovalifolium*, a native of Penang, supplies good caoutchouc. (See INDIA-RUBBER.) The leaves of C. (*Solenostemma*) *Argel* are used to adulterate Alexandrian senna. See also VINCETOXICUM.

Cynaroceph'alæ, a division of *Compositæ* (q. v.).

Cyn'ics, a philosophic sect founded in the 4th c. B.C. by Antisthenes (q. v.), an Athenian and disciple of Socrates. The C. were so called either from the Cynosarges, a gymnasium where their founder taught, or from the Gr. *kunikoi* ('doggish'), because of their snarling captiousness, or of the bestiality into which they sank. Their tenets were Socratic in so far as they advocated ethical in opposition to physical inquiries. They made virtue synonymous with self-denial and contempt of fortune. Their bracing but narrowing teaching appeared in nobler form in the Stoical school. Among the most famous C. were Diogenes (q. v.), Crates, and Menippus.

Cyn'ips. See GALL-FLY.

Cyn'odon, a genus of grasses, only one (*C. Dactylon*) of the fourteen species of which is a native of Britain. It inhabits the southern coasts of England. Its roots, in common with those of another species (*C. lineare*), are reputed to possess some of the properties of sarsaparilla. In India it is known as *Dhob*, *Doorba*, and is one of the chief fodder grasses.

Cynomo'rium, a genus of plants belonging to the natural order *Balanophoraceæ*. *C. coccineum* is found in the island of Malta, and more particularly on a single rock in the islet of Gozo; is fungus-looking in appearance, and was long celebrated as the *Fungus Melitensis*. It is found in the Levant, Northern Africa, and the Canary Islands, where it is esteemed as an article of food. It was formerly highly esteemed as a styptic and astringent, and was used in Malta to produce abortion; and at one period was so much valued as a remedy for dysentery, &c., that the rock on which it grew was carefully watched, and its produce deposited in a Government office, whence it was sent as a precious gift to friendly sovereigns by the Grand-master of the Knights of Malta. Even under the British Government, until recently, the office of keeper of the rock was kept up.

Cyn'osure (Gr. *Kynosoura*, 'the tail of the dog'), a name given to Ursa Minor, a northern constellation, whose tail terminates in the Pole-star. It was the object by which travellers and mariners directed their course, and hence has arisen its metaphorical application to anything to which attention is strongly directed :—

> 'Where perhaps some beauty lies,
> The *cynosure* of neighbouring eyes.'—Milton, *L'Allegro*.

Cynosu'rus. See DOG'S-TAIL GRASS.

Cypera'ceæ, or **Caricin'eæ**, a natural order of glume-bearing Monocotyledonous plants, of which about 120 genera and 2000 species are known. They are found all over the world, though chiefly in moist, cold, and temperate regions. Some are demulcent, others bitter and astringent. The long underground stems of *Carex arenaria* bind together drifting sands, and are for that purpose planted on parts of the coast. The herbage of one of them has very nutritive properties, but the order possesses no marked economic or medicinal species. The creeping underground stems of *Carex arenaria* have been used as a substitute for sarsaparilla, under the name of *German sarsaparilla*; and the species known as 'carnation grasses' (*C. hirta*, *C. præcox*, &c.) are erroneously believed to cause 'rot' in sheep. *Eriophorum*, or Cotton-Grass (q. v.), and the *Papyrus* of the Nile (q. v.), also belong to this order. See also CYPERUS, CAREX, SCIRPUS, and BULRUSH.

Cype'rus, a genus of plants of the natural order *Cyperaceæ*, most of the species of which are tropical. The tubers or corms of many are mucilaginous and nutritious, while those of others are bitter and medicinal. Among the latter may be classed *C. longus*, the rhizomes of which are astringent, tonic, and stomachic, and were at one time employed in medicine, but now, from their odour of violets, are more valued in perfumery, as are some of the Indian species. The tubers of *C. esculentus* (the *Souchet comestible* or *Amande de terre* of the French) are used for food in the S. of Europe, and when roasted can be substituted for cocoa and coffee. They are also employed in making *Orgeat* (q. v.). Unlike most of its order, its roots contain a fixed oil. The tubers of *C. bulbosus* and *geminatus*, though small, can be used as an article of food. From *C. textilis* of India, and other species, mats, &c., are woven. The roots of other species bind drifting sands together.

Cypræ'a. See COWRY.

Cy-Près, a term of English legal doctrine. In certain cases, where the will of a testator cannot be precisely carried out, the court will, by the doctrine of C.-P., administer as closely according to the will as the law permits.

Cy'press (*Cupressus*), a very large genus of evergreen trees and shrubs, type of the *Cupressineæ* family of conifers. *C. sempervirens* of Persia and the Levant is planted in burial-grounds. It has two well-marked forms, *C. fastigiata* and *C. horizontalis*. *C. torulosa* of the Himalayas is an elegant species, naturalised in parts of England. *C. glauca*, another Indian species, though hardy in Portugal, can seldom stand our winters without protection. *C. funebris* of China is a valuable ornamental hardy evergreen. *C. macrocarpa*, *Goveniana*, *Lawsoniana*, and other species from N. W. America, are well known as hardy ornamental trees. The wood of *C. sempervirens*, believed to be the *cedar wood* and *gopher wood* of the Bible, is perhaps the most durable of all woods. All of them are highly scented, and at one time this balsamic odour from the wood was believed to be salutary in chest-diseases. The term C. is also applied to *Taxodium* (the *bald C.* of America); the broom C. and summer C. to *Kochia scoparia*; deciduous C. to *Taxodium distichum*; ground C. to *Santolina Chamæcyparissus*; the embossed C. is *Glyptostrobus*; the yellow C. or cedar is *Thujopsis borealis* (*Cupressus Nutkaensis*). *Thuja gigantea* (*T. Menziesii*) is never known by that name in its native region (N. W. America).

Cypress Knees. See EXOSTOSIS.

Cyp'rian, Thascius, one of the fathers of the Church, was born at Carthage about 200. He was highly educated, became a teacher of rhetoric, and was converted to Christianity in 245. As the brilliancy and popularity of his lectures had won him a great reputation, the pagan party was intensely chagrined at his change of faith, and sought to cover him with ridicule. C. was indifferent to its censure and reproaches, devoting himself to the study of the Bible and his favourite author, Tertullian. On account of his zeal and earnestness in religion he was made a presbyter a few months after his baptism, and Bishop of Carthage in 248. C.'s episcopal career was spent amidst the storms of persecution and theological strife, and his writings are marked by an intense and high-wrought feeling. During the Decian persecution (250) he retired into concealment for about two years, but his enforced seclusion was not spent in idleness. Letter after letter was shot forth from his retreat, full of warning, direction, exhortation, and he was never more vigilant in his episcopal supervision than when he dared not show his face in Carthage. On his return he was engaged in a controversy regarding the reception of the lapsed —that is, those who during the persecution had publicly renounced Christianity—as well as in the Novatian controversy. In 257, in the persecution under Valerian, C. was banished to Curubis. Here as usual his pen was active. Recalled next year by the governor, in consequence of the rigorous edict that all bishops, priests, and deacons were to be put to death, C. was executed at Carthage in presence of an immense crowd. His genuine writings consist of eighty-two epistles and thirteen treatises. On account of his high ideas of episcopal power he has always been a great authority in the Roman Catholic and other Episcopal Churches. The best editions of C.'s works are those of Bishop Fell (1682), and of Maran (Par. 1726). There is an English translation (1868–69) in Clark's *Ante-Nicene Fathers*. See Rettberg's *Cyprianus dargestellt nach Seinem Leben und Wirken* (Gött. 1831), and Poole's *Life and Times of St Cyprian* (Lond. 1840).

Cyprin'idæ, a family of Teleostean fishes represented by the Carps (q. v.), Minnow, Bleak (q. v.), Roach, Barbel (q. v.), Bream, Tench, &c. In this family the mouth is small and the jaws toothless, the upper jaw being formed by the intermaxillary bones. Teeth exist in the inferior pharyngeal bones,

and these bite against the base of the skull, which is covered with horny plates. The head is small, and dorsal fin single. No pyloric cæca exist, and the air-bladder is generally divided. Most C. inhabit fresh water.

Cyprinidæ is also the name given to a family of Lamellibranchiate mollusca, including shells belonging to the genera *Cyprina*, *Crassatella* (q. v.), *Isocardia* or heart-cockles, *Cardita*, &c. The shells are equivalve and closed, the ligament external, and the mantle lobes united posteriorly, and pierced by two siphonal apertures. The foot is thick and tongue-shaped.

Cyprinodon'tidæ, a family of Teleostean fishes, distinguished by having small jaw-teeth, but numerous teeth in the throat. The branchiostegal rays are five or six. The head is scaly, and no soft dorsal fin exists. To this family belongs the *Anableps* (q. v.), and the genus *Orestias* of S. America.

Cy'pris, a genus of Entomostracous Crustacea (q. v.) belonging to the order *Ostracoda*. They are familiar freshwater fleas. They have a bivalve shell or carapace, from which the feet, numbering two or three pairs, are protruded at will. The carapace is closed by an adductor muscle. A pair of tail-appendages subserve locomotion. *C. vidua* and *C. tris-striata* are well-known species.

Cy'prus (Gr. *Kupros*, mod. Gr. *Kebris*), an island in the N.E. of the Levant, its eastern extremity, Cape Andreas, being 95 miles W. S. W. of Antioch. Its greatest length is 120 miles, and its greatest breadth 60 miles. Area, 5,320 sq. miles; pop. (1878) 180,000, of whom fully two-thirds are Greeks. The mountains are grouped in two chains, one running parallel to the N., the other to the S. coast. The latter is the higher, reaching in Mount Troodos (anc. *Olympus*) an elevation of 6655 feet. Between the two ranges lies the great plain of the Messorie (or Messaria), rich in cereals, vines, cotton, madder roots, locust-beans (10,000 tons yearly), sumac, all of which are exported. Salt is inexhaustible in certain lakes (the two largest are near Larnaca and Limasol), tobacco is now grown in small quantity (twenty years ago it was an important product), and wool forms a staple article of commerce, though the climate is so dry that frequently there is but little pasturage. In 1869 the crops were a complete failure, and the poorer inhabitants were reduced to great extremities. The geology has not been fully investigated, but it would seem that the axes of the chain are of igneous origin, being flanked by limestones, sandstones, and slates. Coal, sulphur, and various minerals might be worked to advantage, and under the new British rule this will probably be the case. Anciently it was famous for its copper-mines, the name 'copper' being derived from the island. A telegraphic cable, laid in 1871, connects Nicosia with Latakieh on the Syrian coast. The annual exports range from £310,000 to £200,000, and the imports amount to about two-thirds of the exports. The capital is Nicosia or Lefkosia (q. v.); the chief ports, Larnaca (q. v.) and Famagosta. The ancient capital of C., Paphos (q. v.), was held to be a favourite abode of Venus. C. was ruled by petty kings till it was subdued by Cyrus of Persia. It was subsequently conquered by the Greeks in 477 B.C.; was annexed to Egypt about 323 B.C., and became a Roman province in 58 B.C. After the division of the Roman, it formed part of the Byzantine Empire. In 648 A.D. it was taken by the Saracens, from whom it was soon retaken by the Greeks. In 803 it was captured by Harûn-al-Rashid, but was won back by Nicephorus II. Richard I. of England reduced it in 1191, and ceded it the succeeding year to Guy de Lusignan, whose descendants reigned over it till 1489, when Caterina de Cornaro (q. v.) sold it to the Venetians. It was finally taken by the Turks in August 1571, in whose hands it remained till 1878, when by a convention between Great Britain and Turkey, dated 4th June of that year, the government of the island was transferred to the former power. C. is now virtually a British possession, and its first British governor, Sir Garnet Wolseley (q. v.), in the month of August 1878 proclaimed the authority of Queen Victoria amidst the enthusiasm both of Greeks and Turks. See Unger and Kotschys' *Die Insel Cypern* (1865), for natural history, climate, products, &c.; also De Mas Latrie, *Histoire de l'Ile de C. sous de Règne des Princes de la Maison de Lusignan* (Par. 1861-62); and for antiquities, Cesnola's *C., its Ancient Cities, Tombs, and Temples* (Lond. 1877). See also an interesting and valuable volume on the history and present condition of C., by R. Hamilton Lang, for many years H.M. Consul for the island (Macmillan & Co., Lond. 1878).

Cyp'selus. See SWIFT.

Cyr, Saint, L'École, a village in the department of Seine-et-Oise, France, in the great park of Versailles, 12 miles S.W. of Paris, is notable in connection with an institution (*Maison de St. C.*) founded here by Louis XIV. in 1686, for the upbringing of 250 daughters of the nobility. This building was erected at the desire of Madame de Maintenon, who retired to it on the death of the King to spend the remainder of her life. In 1793 it was converted into a military hospital, and in 1806 Napoleon transferred hither the military school of Fontainbleau, where it has since remained as the *Ecole Spéciale Militaire de St. C.*, educating some 300 officers, infantry and cavalry, of the general staff, and of the Marines.

Cyrena'ic School. See ARISTIPPUS.

Cyrena'ica, anciently a district of N. Africa, named after its capital, Cyrene (q. v.). In its widest sense it included the region stretching on the N. from Carthage on the W. to Egypt on the E., and from the Mediterranean to the oasis of Phazania (Fezzan) on the S. The Greek colony, however, established here in the 7th c. B.C., occupied only the tableland of Barca (q. v.) and the terraces between it and the coast. Fanned by cool sea-breezes, and sheltered by the broad plateau from the hot winds of the Sahara, these terraces, well watered, and enjoying a diversity of climates, were among the most delightful and fertile regions of the globe, and furnished a succession of harvests for eight months of the year. Corn, wine, oil, honey, and fruits of all kinds abounded, and the district was famous for its breed of horses. From the time of the Ptolemies C. was sometimes called Pentapolis, from its five chief cities, Cyrene, Barca, Teucheira, Hesperides, and Apollonia. C., after being a Roman province, was subdued by Chosroes (A.D. 616), and finally overrun and wasted by the Arabs (A.D. 647). The whole region is rich in valuable remains of antiquity. See Barth's *Wanderungen durch die Küstenländer des Mittelmeeres* (Berl. 1849).

Cyre'ne (Gr. *Kurēnē*: Doric form, *Kurānā*, corrupted by the modern Arabs into *Grenneh*), the capital of Cyrenaica, founded 631 B.C. by a colony of Dorians under Battus, whose dynasty terminated about 450 B.C., when a republic was established. It subsequently became a Roman colony with the title of *Flavia*. C. was long the chief Greek colony in Africa, and several of its sons were distinguished in the annals of Hellenic intellect; as the poet Callimachus, a scion of the royal house of Battus, the philosophers Aristippus and Carneades, the polyhistor Eratosthenes, and the rhetorician Synesius. Extensive ruins still mark the site of the city. See Smith and Porcher's *History of the Recent Discoveries at C.* (Lond. 1865).

Cyril, St, of Jerusalem, one of the fathers of the Church, was born about 315. Of his earlier years nothing is known, but his writings evince a superior education. He was elected Bishop of Jerusalem in 351. In the Arian controversy then raging he formed one of the middle party, called Semi-Arians, but was nevertheless persecuted by the stricter Arians, through whose influence he was banished from Jerusalem three times. His persistent and unscrupulous opponent was Acacius, Metropolitan Bishop of Cæsarea. In 381, at the Council of Constantinople, he joined the Nicene party, and took an active part in the debates. He died in 386. C. is chiefly distinguished for his catechetical works (edited by Touttée, Par. 1720; and by Reischl and Rupp, Munich, 1848-60), in which he set forth the doctrines of the Church in a popular style.—**St C. of Alexandria**, born at Alexandria about the end of the 4th c., was educated among the monks in the Nitrian desert, and then succeeded his uncle as Bishop of Alexandria (412). He immediately attacked the Novatians, and had their churches shut up, got the Jews banished from the city and their synagogue pulled down, and occasioned other insurrections in Alexandria. He must be held responsible in some measure for one of the most odious crimes in history—the murder of Hypatia (q. v.)—in so far as he inflamed the passions of a fanatical and ignorant community. C.'s chief controversy was with Nestorius, Bishop of Constantinople, who disapproved of the name 'Mother of God,' as applied to the Virgin Mary. At a council held at Alexandria (430), C. accused Nestorius of blasphemy against Christ, and Nestorius, in turn, accused C. of Apollinarianism. (See APOLLINARIS.) A council was convened at Ephesus to settle the dispute, in which C. pre-

sided, and before all the bishops had arrived Nestorius was condemned and banished. When the other Eastern prelates, for whom C. would not wait, arrived, he himself was deposed by them, and a controversy was thus begun between the E. and W. Churches which was not settled at the death of C., 444. In the religious strifes of the time C. plays a foremost part. The popes gave him the most extensive powers and the most unbounded praise, and the Coptic and Abyssinian Christians, among whom he is known as *Kerlos*, call him 'the world's doctor.' C.'s works include *De Adoratione et Cultu in Spiritu et Veritate; Glaphyrain Pentateuchum* ('Polished Discourses on the Pentateuch'); *Commentarius in Isaiam; Commentarius in Duodecim Prophetas Minores; Commentarius in Joannis Evangelium; Explanatio in Psalmos; In Pauli Epistolas Quatuor; Commentarius in Lucam*, and various fragments. The best edition is in Migne's *Patrologiæ Cursus, Series Græca* (10 vols. Par. 1859).

Cyr'il and **Metho'dius**, called the 'Apostles of the Slaves,' were two brothers of distinguished family, born in Thessalonica in the 9th c. M. first embraced a military career, and rose to the rank of general, while C. (whose proper name was Constantine) devoted himself to the study of languages, for which he displayed peculiar aptitude. The Slavic tongue, in various dialects, had long been in use in the valley of the Danube; it had even penetrated as far S. as the Peloponnesus, and in a commercial centre like Thessalonica the brothers had no difficulty in acquiring a familiar acquaintance with it. At Constantinople, whither C. went to complete his studies, he was soon known as 'the Philosopher.' Chosen by the Emperor Michael III. to preach the gospel to the Khasars, who had requested the services of a Christian missionary, he appears to have met with some success among the Turanian tribes of the Ural; but the real commencement of the evangelical career of the brothers was their mission to the Bulgarians, whom they converted to Christianity, and provided with an alphabet adapted from the Greek, by means of which this Slavic people soon acquired through translation some knowledge of the Græco-Christian literature. In 863 C., accompanied by M., who had now become a monk, were sent by the Emperor to the Moravian king. The Slaves of Moravia and Pannonia had been Christians for about a century, but were dissatisfied with their ecclesiastical dependence on the German see of Salzburg. They received with joy men who could enable them to celebrate divine worship in their own language. The brothers spent four years in organising a Slavic service. In 867 they were invited to Rome by the Pope, and were consecrated bishops. It was at this time that Constantine took the name of C., and shortly after died, 13th February 868. M. returned alone to his great work, and became Archbishop of Moravia and Pannonia. The Latin Liturgy was generally displaced by the new Slavic one, and the supremacy of the Archbishop of Salzburg was more and more threatened. The latter appealed to the Pope, and charged M. with numerous heresies. In the end, however, M. got a verdict in his favour, but after a long struggle with the Latin priests of Pannonia, he withdrew to Rome in 881, where he died. The exact date of his death is not known. The brothers have a great place in Christian history. They gave a national character to the religion of the Slavic peoples. The alphabet invented by C., and called the 'Cyrillic alphabet' (Slav. *Kyrillitza*), was adopted by the larger portion of the eastern Slaves, *e.g.*, Bulgarians, Serbs, Bosniaks, Russians, &c.; it was afterwards modified and enlarged in the different countries, according to their respective needs, and the modern Russian and Servian alphabets are directly derived from it. See Stredowsky's *Sacra Moraviæ Historia, sive Vita SS. Cyrilli et Methodii* (Salzb. 1710); Dobrowsky's *Cyril und Method, der Slawen Apostel* (Prag. 1823).

Cy'rus, The Great (called by Greek historians *Palaios* and *Proteros*), said to be the son of Cambyses (the Persian) and Mandane, whose father Astyages, the son of Cyaxares and King of Media, had endeavoured to destroy him as destined by prophecy to usurp the throne, probably succeeded his grandfather in the year B.C. 559, when he changed his name (*Agradatus*) for the Persian *Kobresch*, or sun. The first volume of the *Histories of Herodotus* contains a number of picturesque stories about his birth and childhood. After subduing the principal towns of Media, C. in 546 conducted a great expedition against Crœsus of Lydia, whom he defeated at Thymbra, and took prisoner at Sardis, and afterwards made a satrap of his new empire. The Greek colonies of Asia Minor, with the exception of Miletus, formed against C. the Pannonian League, which received moral support from Sparta; but C. was recalled to the S. by a revolt at home. In the year 538 he was engaged in the conquest of Babylonia, where the luxurious Belshazzar offered only a feeble resistance. His later campaigns seem to have been directed against Bactriana, Margiana, and Sogdiana, the territories forming the upper basin of the Oxus. C. probably penetrated as far as the Massagetæ and Sacæ, and Ctesias has left an account of an expedition against the Derbiccæ. In one of these C. was killed, B.C. 529. His name is thus associated with the predominance of the Persians over the Medes, and of the Zend nations over the Semitic. The *Cyropædia* of Xenophon is not a history, but a kind of ethical romance.—**Cyrus the Younger** was the son of Darius Nothus or Ochus, King of Persia, and Parysatis. While governor of Asia Minor he had assisted the Spartan general Lysander against the Athenians at Ægos-Potamos (B.C. 405). Accordingly when Artaxerxes Mnemon, the eldest son of Darius, succeeded to the throne, and C.'s first conspiracy had failed, it was chiefly from Sparta that he obtained the army of 13,000 Greeks which, under the command of Clearchus, accompanied him on his famous expedition from Sardis in 401 B.C. At Cunaxa, between Pylæ and Babylon, on the Euphrates, he encountered his brother, whom the satrap Tissaphernes had warned of his approach. C. was killed and his Asiatic troops dispersed, but the Greeks held their ground, and began from the battlefield their wonderful 'Retreat of the Ten Thousand' (*Katabasis*) up the Tigris valley, through the highlands of Armenia to Trapezus on the Black Sea. From the accounts left by Xenophon (who was a leader in the retreat), C. appears to have been intelligent and of a good disposition. The *Cyropædia* of Xenophon relates to the elder C. It is interesting to compare the route of C. eastward through Laodicea, Iconium, Tarsus, and Beræa, with the routes of Alexander and the Crusaders.

Cyst (from *kystis*, 'a bladder'), a bag or tunic in animal bodies, which includes morbid matter as a secretion or an endogenous growth, entirely or for the most part its own product. Cysts are formed (1) by a morbid growth, having a distinct elementary groundwork derived from cells or their nuclei; (2) by obstruction, dilatation and growth of natural ducts or sacculi; and (3) by enlargement and fusion of the areolar spaces in connective tissue—the walls becoming condensed, and the inner surface secreting fluid like a serous sac. *Simple* or *barren* cysts contain fluid matter; *compound* or *proliferous* cysts contain variously organised bodies; *sebaceous* or *epidermal* cysts are formed from enlarged hair follicles; *mammary* cysts from enlarged lactiferous tubes; *ovarian* cysts from enlarged Graëfian vesicles; *sanguineous* cysts from dilated blood-vessels, and from hæmorrhage into the cavity of serous cysts; *synovial* cysts in connection with the synovial membrane of the sheaths of tendons; *mucous* cysts in connection with mucous membrane and the ducts of mucous glands. *Nabothean* cysts have their seat at the cervex uteri, and *ranula* is an enlargement of the duct of the sublingual gland. *Serous* cysts or *hygromata* have thin or honey-like contents of a yellow or brownish colour, and *colloid* cysts have glue-like contents. *Proliferous* cysts are compound. The *cystic duct* is the membranous canal that conveys the bile from the hepatic duct into the gall-bladder. The *cystic artery* is a branch of the hepatic. See TUMORS.

Cys'tic Worms, the name formerly given to the scolices or *resting larvæ* of *Tæniada* or tapeworms (which exist in the form of bladder-like cysts), under the idea that they were of themselves distinct and separate forms. (See also CESTOID WORMS, CŒNURUS, ECHINOCOCCUS, STAGGERS, and TAPEWORM.) The name *hydatids* is synonymous with C. W.

Cysticer'cus (Gr. 'bladder-tail'), the name given to the scolices of tapeworms, and formerly to some species of Cystic Worms (q. v.), as the name *Cœnurus* was given to others. All cystic worms themselves, however, are merely stages in the development of tapeworms (*Tæniada*), and not distinct and separate animals. The *C. cellulosæ* found in the pig, and constituting *measly pork*, is the immature form of the common tapeworm of man (*Tænia solium*). The *C. pisiformis* of the rabbit, if swallowed by a fox, becomes the *Tænia pisiformis* of the latter, just as the *C. fasciolaris* of the mouse becomes the *T. crassicollis* of the cat. *Cœnurus cerebralis* from the brain of the sheep, if swallowed by a dog, develops in the latter animal into the *Tænia serrata*. See TAPEWORM.

Cyst'ine is a crystalline substance contained in certain rare urinary calculi, and has the composition represented by the formula $C_4H_7NSO_2$.

Cysti'tis, inflammation of the bladder. See BLADDER, DISEASES OF.

Cyst'olithes (Gr. 'bladder-stones'), clusters of crystals found in the superficial cells of nettles and some other species of the order *Urticaceæ*, and various genera of *Acanthaceæ*, &c. They are globular or club-shaped and of various other forms, 'usually hanging by a short stalk in an enlarged cell; their principal mass is found to be cellulose, but their surface is studded with crystalline points of carbonate of lime.' The crystalline contents of the cells are enclosed by the general cell-wall, and by a very delicate organic covering closely applied to every part.

Cyt'isus, a genus of plants of the natural order *Leguminosæ* (sub-order *Papilionaceæ*). Laburnum (q. v.) and other species are much esteemed as ornaments in shrubberies and greenhouses. See also BROOM.

Cyt'oblasts, a name given to new active cells in animal and vegetable structures. Sometimes the term has been restricted to the nucleus of the cell. See CELL.

Cyt'oplasm is a semi-fluid molecular material in which cells may originate or grow. See CELL.

Cyz'icus, a peninsula of Anatolia, projecting into the Sea of Marmora, and connected with the mainland by a sandy isthmus. It stretches from E. to W. 18 miles, and from N. to S. 9 miles. C. was once an island, its connection with the mainland being attributed to Alexander the Great. Cherry-orchards and vineyards now surround the ruins of the ancient city of C., which in size and beauty was one of the foremost cities of Asia.

Czacki, Tadeusz, a Polish author and administrator, was born August 28, 1765, at Poryck, Volhynia. He held the posts of director of the crown archives at Warsaw, and, as member of the commission of inquiry into the Polish revenue, did his best to give new life to the trade and industries of Poland. But his chief efforts were devoted to the improvement of the education of his countrymen in the Polish provinces of Russia under the Emperor Alexander. In 1807 he was appointed deputy of Prince Czartoryski, who had the care of public instruction in the Polish government of W. Russia. By energy, personal liberality, and strong appeal to the patriotic feelings of his countrymen, he was enabled to establish eighty-five primary schools in Volhynia, twenty-six in Podolia, and fifteen in the Polish Ukraine, besides a great lyceum at Krzemienietz. C. died 8th February 1813, at Dubna, Volhynia. Of his works, which are numerous and varied, one of the most valuable is that upon Lithuanian law. In 1832, by the order of the Czar Nicholas I., the scientific establishments founded by C. were abolished, the artistic and literary treasures collected at Krzemienietz were carried away, partly to St Petersburg and partly to the new Russian University at Kiew. See *History of the Life and Works of C.*, by Osinski (Krzemienietz, 1816).

Czar (Russ. *tsarj*, 'king,' probably a corruption of the Byzantine *Kaisar*, Lat. *Cæsar*, though some etymologists seek for its origin in the *sar* that ends the names of Assyrian kings), a title of the Emperor of Russia. It was in partial use as early as the 12th c.; but it was not till the 16th c., when Ivan II., surnamed the Cruel, caused himself to be crowned C. of Moscow (1547), that the Muscovite princes formally adopted the title. After the conquest of Little Russia and Smolensk in 1654, they called themselves Czars of all the Russias—*i.e.*, of Great, White, and Little Russia. The word is now practically equivalent to emperor. The consort of the C. is named Czarina, his eldest son Cesarevitch, and his eldest daughter Cesarevna.

Czartorys'ki, a celebrated Polish family of Lithuanian origin, which can be traced back to the 14th c. In the same century also appears a Russian branch connected with the line of Rurik, and possessing the village of Czartorysk in Volhynia, from which the later name of the family is derived. The latter first became Polish in the person of Fedorovicz C., who in 1570 subscribed the union of Lithuania with Poland. With Georg Ivanovicz C. (died 1622) the family passed over from the Greek to the Roman Catholic Church. In 1623 the heads of the family were made princes of the German empire; in 1785 they received the Austrian 'Indigenat,' and in 1788 the Hungarian Diet conferred on them the rank of 'magnates.' For a considerable period the family flourished in two main lines, an elder at Novogorod, and a younger at Klevan. The former became extinct in the time of Sigmund the Elder; the latter was subdivided into two branches, that of Zukov and that of Korzec, of which the latter became extinct in the male line in the person of Prince Joseph Clemens C. (died 1810). To the Zukov line belonged **Prince Michael Friedrich C.**, born 26th April 1696, died Grand-Chancellor of Lithuania, 13th August 1775. His nephew, **Prince Adam Kasimir C.**, born 1st December 1734, noted for his wealth, intelligence, and learning, was a candidate for the throne of Poland after the death of August III., but was defeated through the influence of the Empress Catherine of Russia, who favoured Stanislas Poniatowski. After the first partition of Poland, C., who had extensive estates in Galicia, entered the Austrian service, rose to the rank of field-marshal, but was never untrue to Poland. At the Congress of Vienna he headed a deputation to the Russian Emperor, and submitted to him a 'Constitution' for his native country. C. died at Sieniawa in Galicia, 19th March 1823.—**Prince Adam Georg C.**, son of the preceding, was born at Warsaw, January 14, 1770. After an education at Edinburgh and London, he took part in the second Polish partition war. Being afterwards taken to St Petersburg as a hostage, he gained such favour with the Emperors Paul and Alexander, that he filled in succession the posts of ambassador to Sardinia, assistant to the Minister of Foreign Affairs, and curator of the University of Wilna; but when the Revolution of 1830 broke out, he gave both his heart and his property to his countrymen, and in 1831 became head of the National Government. When the insurrection was crushed, C. was specially excluded from the amnesty, and went to live in France. The most notable event in his later life was the liberation of his serfs in Galicia in 1848. C. died at Montfermeuil, near Paris, July 26, 1861. His eldest son, **Prince Witold**, born 6th June 1824, is the present head of the family.

Czas'lau (Boh. *Caslawa*), a town of Bohemia, 46 miles E.S.E. of Prague. Its deanery-church steeple is the highest in Bohemia. C. has manufactures of brass, coffee substitutes, beet-root sugar, and alcohol. Pop. (1869) 5998. During the Thirty Years' War the place suffered much. Near it, on the 17th May 1742, the Austrians were defeated by Friedrich II. of Prussia.

Czechs, the name given to the branch of the great Slavic family which has spread farthest west. Driven forward by the Avari (q. v.), they came, in the latter half of the 6th c., into the country now called Bohemia (q. v.). The C. are first mentioned by the earliest Russian chronicler, Nestor, who wrote during the latter half of the 11th c.

Language and Literature.—The Czech language, a branch of the widely-spread Slavic, is spoken in Bohemia, Moravia, and, with some modifications, by the Slovacks in the N. of Hungary. In the 15th c. it began to be written in Roman characters. It has forty-two open vowels and distinctly marked sounds, is rich, precise, and euphonious, and, like the classical languages, is ruled by quantity rather than accent. In its complicated grammar there is a dual number, while there is no separate form for the passive voice. The best grammars are those of Burian (3d ed. Vienna, 1850), Koneczny (3d ed. Vienna, 1855), Tomiczek (4th ed. Prague, 1865). The best lexicons are those of Franta-Schumansky (Prague, 1859), Koneczny (3d ed. Vienna, 1855), Rank (1871). The Czech literature began to clearly develop itself in the 13th c.: there are even traces of it as far back as the 10th c. The rhyming Chronicle of Dalimit (1314), the *Manual for Children* by Schtitny (1376), and the poem, *The Council of the Beasts*, by Smil von Pardubitz (1384), are famous books of the times before Huss. The era introduced by that Reformer (1469–1526) gave a powerful impetus to prose. Doctrinal, polemical, devotional, and political writings became numerous. The *Travels* of Postupik (1464) and Lobkowitz (1493) may be mentioned, and also the political writings of Ctibor of Cimburg (1494) and Cornelius of Wschehrd (1520). The Augustan age of Czech literature was from 1526–1620. During this period the Bohemians were free and prosperous. Literature was fostered by the two universities at Prague, and the language became matured. The names of Streyc and Lomniki of Budecz are famous in poetry; Bartosch (died 1544), Sixtus of Ottersdorf (died 1583), Blahoslav (died 1571), Brzezan (died 1610), and Dacicky (died

1629) are eminent as historians, and Beneschowsky and Abraham of Ginterrod as students of language. The Bible was translated and published 1579-93. But the Thirty Years' War (1618-48) was an irreparable disaster, not only to the literature but to the nationality of the C. During that war, the Jesuits burnt most of the books which had been produced between 1414 and 1635. An imperial decree, issued in 1774 and also in 1784, prohibiting the use of the Czech language in the higher schools, was another disaster to Czech literature; but the writings of the historians Count Kinsky (1774), Parizek (died 1823), Prochazka (died 1804), the popular author Kramerius (1783), and the poet Jungmann (1805) kept it alive. Since 1818, however, Czech literature has had fair scope. The language has been permitted by imperial edict in the higher schools; valuable remains of old literature have been discovered, and fresh literature has been largely produced. Poetry, belles-lettres, history, archæology, and science are assiduously cultivated. Among the newer poets are Kollar (died 1852), Czelakovsky (died 1852), Agnell Schneider, Vinaiczky, Tomicek; the fabulist Zahradnik; the lyrical poets Marek, Turinski, Hanka, Kamaryt, Chmelinski, Stule; the idyllic Langer; the dramatists Stzepanek, Machaczek, Klicpera, and Ulczkovsky; the didactic Jablonski; the epic poets Huievskovski, Negedly, Holy, and Wocel. Among the national historians are Palacky and Tomek; Schafarik and Wocel are distinguished in Czechic antiquities; Jungmann, Schafarik, Hanka, and Piesl in Czechic philology. See the works of Dobrowsky (2d ed. 1818), Jungmann (1825), Count Thun (1842), Wocel (1845), Wenzig (1855), Hanus in his *Quellenkunde der Bohm. Literaturgeschichte* (1868), and A. H. Wratislaw, *Native Literature of Bohemia in the 14th c.* (Lond. 1878).

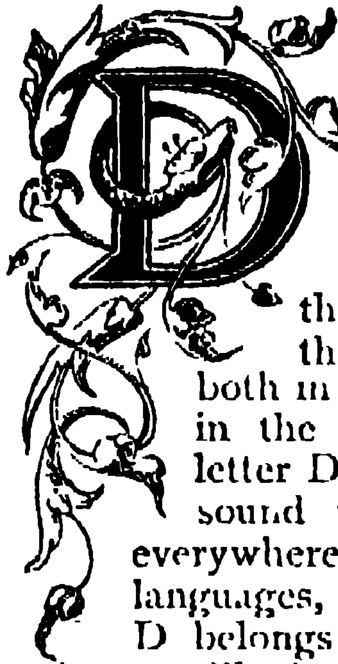
Czeg'led, a town of Hungary, 43 miles S.E. of Pesth by railway. The chief industries are brewing and agriculture. Pop. (1869) 22,216.

Czens'tochau, or **Czenstochōva**, a monastery of the order of St Paul the Hermit, on the summit of Mount Klarenberg (Pol. *Jasnogora*), in the government of Warsaw. In the church of the monastery is the famous dark-brown Madonna which the legend asserts to have been painted by St Luke, and which has made C. the favourite resort of Roman Catholic pilgrims in Russian Poland. In 1655, by the help, it was believed, of the Virgin, the monastery, manned by 70 monks and 150 soldiers, withstood for thirty-eight days 10,000 Swedes and a part of the Polish army. The Emperor Alexander allowed the works to be demolished after C. came into the possession of Russia in 1813. At the foot of the mount on which the monastery stands lie the two towns of 'Old' and 'New' C., which carry on a lively trade in amulets and images. Pop. 11,621.

Czern'owitz (Slav. 'Black Town'), the capital of the crownland of Bukowina, in Austro-Hungary, on the Pruth, 138 miles S.E. of Lemberg by railway. It has a Greek cathedral, hardware manufactures, and a considerable trade between the Moldau and Bessarabia in timber, wool, skins, cattle, and brandy. Over the river, here 760 feet wide, stretches a bridge of six arches. Pop. (1872) 33,884.

Czer'ny, Georg, popularly *Karadgorge* ('Black George'), a Servian leader, was born at Vishevac, near Belgrade, December 21, 1771, and was originally a swineherd and drover. He was led to take an active part against the Turks by the plunder of his cottage in 1801 by janissaries. Gathering round him a band of discontented Servians, and secretly supported by Russia, he raised an insurrection against the Turks, and ultimately captured Belgrade. He was even recognised in 1808 by the Porte as Prince of Servia, but a new struggle with Turkey taking place, he had to flee to Russia, and then to Austria in 1812. C. returned to Servia in 1817, but was murdered in the July of that year at the instigation of Prince Milosch, the new ruler of Servia. When the latter was deposed in 1842, C.'s second son, Alexander, known as *Karadgordjevitch* ('son of Black George'), was elected his successor, but was obliged to resign in 1858. See Forsyth's *Slavonian Provinces* (Lond. 1876).

D.



formed the fourth letter in the Phœnician alphabet, and it holds the same place in all the alphabets derived from that source. Its Semitic name was *daleth*, which means 'a door,' and is familiar to us through its Greek equivalent, *delta*. This name is thought to be derived from the original form of the letter (Δ), like a tent-door, which is the same both in Phœnician and Greek, and is scarcely altered in the Roman capital. The pronunciation of the letter D has also retained a similar uniformity. The sound which it expresses in English, it expresses everywhere, except in the Spanish and modern Greek languages, in both of which it is pronounced like *th*. D belongs to the class of consonants called Dentals, and is readily interchangeable with the other members of the same class, especially with *th* and *t*. Examples of this change are *theos* in Greek and *deus* in Latin, *dell* or *dale* in English and *thal* in German. A good example of a double change is *tod* in German, which in English becomes 'death.' D is also interchanged, though less regularly, with *l* and *r*. *Odusseus* and *dakru* in Greek correspond to Ulysses and *lacrima* in Latin; and in Latin itself, *ar-cesso* is only a surviving archaic form of *ad-cesso*. As *b* has an affinity for *m*, so D exhibits a tendency to affix itself after *n*, originally as a mere euphonic change in pronunciation, but finally as a recognised alteration in spelling. Thus, the Latin *tener* becomes the English 'tender;' and 'kind' is only another form of 'kin.' When followed by *i*, D sometimes becomes *j*, as 'journal' from *diurnus;* and when conjoined with *s* it forms the origin of *z*. As a numeral, D stands for 500, being manifestly a condensation of IƆ. As an abbreviation, it is best known as standing for doctor in D.D. and M.D.; and d.d. is to be understood as meaning *dono dedit*.

D, in music, the note next above the tonic in the scale of C major. The vibration fraction D : C is $\frac{9}{8}$.

Dab (*Platessa limanda*), a genus of Teleostean fishes belonging to the family *Pleuronectidæ*, or Flat-fishes. The D. is recognised by the rough or somewhat spiny nature of its back, hence the specific name *limanda* or 'file-backed.' It is of lighter colour than the allied Flounder (q. v.), and the lateral line is more curved than in the latter fish. The average length is 12 inches. The smooth or lemon D. (*P. microcephala*) is a second species, with a smaller head and still lighter colour than the common D.



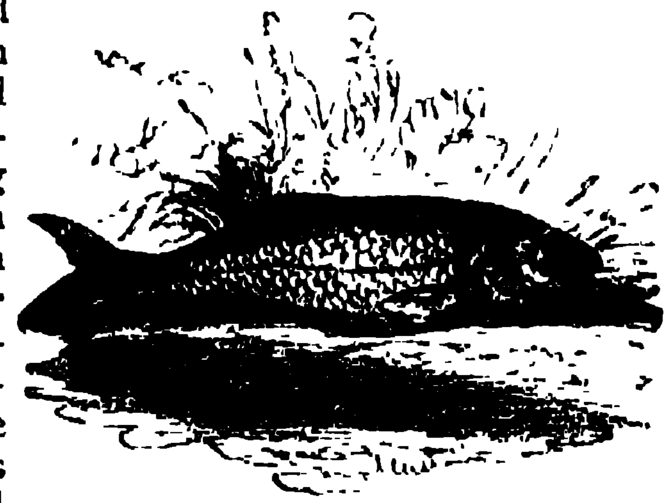
Dab.

Dab-Chick. See Grebe.

Da Capo (Ital. 'from the beginning') and **Dal Segno** (Ital. 'from the sign'), terms used in music to indicate a repetition from the commencement, or from the mark :S: respectively.

Dacca (Sansk. *Da-akka*, 'the hidden goddess,' from a statue of Durga found there), the capital of a district of the same name, in the province of Bengal, British India, on the Burha Gunga ('Old Ganges'), 40 miles E. of Goalband, the present terminus of the Eastern Bengal Railway, and 190 miles N.E. of Calcutta, across the Gangetic delta. It has 180 mosques, 120 Brahmanical temples, a Government college, numerous schools, an hospital, and several ruined palaces, also ten bridges, thirteen ghâts, several bazaars and public fountains. But it is no longer celebrated for its manufacture of striped and figured muslins and delicate Kasheeda or embroidered cotton cloth, having, indeed, few industries now beyond the production of lac, dye, soap, cheese, and the gold and silver ornaments which find a market in Calcutta on account of their ingenious and original designs. As many as from 200 to 300 elephants are usually kept in the depôts here for sale. In 1871 the rainfall at D. was 82 inches, and the mean temperature was 72° Fahr. Pop. (1872) 69,212, including a small number of Portuguese, Greek, and Armenian merchants. In 1608 D. was made the seat of government of the Nabobs of Bengal. It reached the height of its prosperity under Aurungzebe, and later was visited by the Portuguese, Dutch, and French, who here erected factories. The British gained possession of the city and state in 1765, but descendants of the native ruler were granted allowances till as late as 1845.—The *district*, which is intersected by numerous rivers, yields great quantities of rice, tea, indigo, &c., and has manufactures of coarse cloth, cocoa-nut oil, country paper, and iron and brass implements. Area, 2897 sq. miles; pop. (1872) 1,852,993, of whom 1,050,131 are Mohammedans, 793,789 Hindus, only 209 being Europeans, and 7245 native Christians. The prevailing language is Bengali.

Dace, Dart, or **Dare** (*Leuciscus vulgaris*), a genus of freshwater Teleostean fishes, included in the family *Cyprinidæ* (q. v.) of that order. It is allied to the Chub (q. v.), Roach (q. v.), Barbel (q. v.), and Bleak (q. v.), and is generally found in slowly-running streams in England and on the Continent. It is a dullish blue on the upper, and white on the under parts; the gill-covers and cheeks being silvery white. The average weight is about three-quarters of a pound, but a half-pound fish is considered a good take. In shape it is somewhat elongated. The scales are smaller than those of the roach. The flesh is not of particularly fine quality. The D. is fished for with line and float, baited with red-worm, lobworm, gentles, or flies. It is very voracious, and very lively in its movements. The spawning season is in April and May.



Dace.

Da'cia, the country of the Daci, originally called *Getæ*, a people of Thracian origin, comprehended, in its widest acceptation, the countries now known as Hungary (E. of the Theiss), Transylvania, the Bukowina, the S. of Galicia, Moldavia (W. of the Pruth), Wallachia, and the Banat of Temesvar. Of the history of the Daci before the time of Philip of Macedon almost nothing is known, but even then (335 B.C.) they were a powerful race, and had established themselves on both sides of the Danube. In 292 B.C. they compelled the Thracian king, Lysimachus, who had invaded their territory, to surrender with his whole army. Curio, the first Roman general who penetrated as far N. as the Danube, did not dare to attack them. Augustus, in 10 B.C., sent Lentulus against them, but without success. From this time the wars between the Romans and the Dacians were frequent; and eventually the latter, under their king, Decebalus, obtained such a decided advantage over Domitian as to compel him to accept their terms and pay a yearly tribute. Thus matters continued till Trajan, in 101 A.D., set out through Pannonia, crossed the Theiss, marched along the valley of the Maros into Transylvania, and defeated them in a great

battle near Thorda, on a field called to this day *Prat de Trajan* (Trajan's field). Decebalus, however, soon broke the conditions of peace imposed by the Emperor, and in 104 A.D. Trajan again set out against them. The Daci, unable to defend their capital, fired it and fled; while their leader, to avoid captivity, stabbed himself. D. now became a Roman province; colonists were sent thither; a bridge was built across the Danube, and the country was intersected by three great roads. In the time of Aurelian (270-275 A.D.) the Romans abandoned D. to the Goths. After submitting to the Gepidæ, Lombards, and others, it fell under the dominion of the Magyars in the 9th c. See Wilkinson's *Wallachia and Moldavia*, and Paget's *Hungary and Transylvania*.

Da'cier, André, a French scholar and critic, was born of Protestant parents, near Castres, in Languedoc, April 6, 1651. After studying at Saumur under Lefevre, whose daughter Anne he afterwards married, he went to Paris in 1672. There he was employed to prepare for the Dauphin's use an edition of various classics, known as the *Delphin Edition*. D. and his wife renounced Protestantism in 1685. He became librarian of the Louvre, member of the Académie des Inscriptions, and secretary of the Académie Française. He died September 18, 1722. D.'s once brilliant reputation as a critic has greatly faded; his editions and translations are very indifferent. See Nicéron, *Mémoires*.—His wife, **Anne D.**, born at Saumur in 1651, rivalled her husband in erudition, and shared in his editorial labours. Her chief work, a translation of the Iliad (1711), involved her in a controversy with Lamotte. She attacked him, said Voltaire, like the head of a college, and he answered like a polite and witty woman. In the great controversy as to the respective merits of ancient and modern literature, along with La Fontaine and Boileau she advocated the ancients against Perrault, Lamotte, and others. Madame D. executed translations of Terence, Plautus, Anacreon, and Aristophanes. She died August 17, 1720. See Sainte-Beuve's article *Sur Madame D.* in his *Causeries du Lundi*.

Dacoits' (Beng. 'robbers'), a term used in India for a class of robbers. They live apart in a semi-savage state, and sometimes go in gangs of forty or fifty.

Daco'ta. See DAKOTA.

Dacryd'ium, in botany, a genus of trees of the natural order *Taxaceæ*, indigenous to New Zealand, Tasmania, and the E. Indies. The principal New Zealand species is *D. taxifolium*, which in a few cases reaches a height of 200 feet, and yields a valuable timber. *D. Franklinii*, the Huon pine of Tasmania, is a noble tree, yielding very valuable timber as well as splendid spars for ships.

Dac'tyl (Gr. *dactylos*, 'a finger,' because each finger consists of one long joint and two short ones) is the name of a trisyllabic foot in Latin and Greek versification, of which the first syllable is long, and the other two short, as *cărmĭnă*. In dactylic verse the D. is the prevailing foot, and the only other foot admissible in it is the spondee. The most important of the dactylic verses is the Hexameter (q. v.). In English verse a D. consists of one accented and two unaccented syllables, as *lúnacy*.

Dac'tylis. See COCKSFOOT GRASS.

Dactylop'terus. See FLYING GURNARD.

Dactylorhiz'a, a disease of carrots, turnips, and other agricultural plants, in which the root divides and becomes hard and worthless. It is commonly called 'fingers and toes.' Mr Berkley thinks that it is not properly a disease, but only a tendency in the plant to revert to the wild state, and can only be remedied by a careful selection of seed. It must be distinguished from 'anbury,' which is caused by the attacks of insects.

Da'do (Ital. 'a die,' 'a cube'), in classical architecture, denotes the solid block or cube which forms the body of a pedestal between the base mouldings and the cornice. The name is also applied to wainscoting about the height of a chair-back, which resembles a continuous pedestal round a room.

Dadur', a town of Beluchistan, 5 miles E. of the Bolan Pass. The principal products of the neighbourhood are cotton, sugar, madder, and several kinds of grain. Pop. about 3000. The British here defeated a Kelat force in November 1840. The heat at D. is so intense that it has reddened the unburnt bricks of the ancient sepulchres.

Dæ'dalus (Gr. 'the cunning worker'), a famous artist and mechanician of the heroic age of Greece, is represented as an Athenian of the royal race of the Erechtheidæ, being, according to some, the son, according to others the grandson, of Eupalamus, the son of Erechtheus. To D. is ascribed the invention of carpentry and most of its tools—the saw, the axe, the plumb-line, the auger—and glue. Among his greatest achievements in sculpture and architecture were the Cow of Pasiphae, the Cretan Labyrinth, the Colymbēthra near Megara in Sicily, the impregnable rock-fortress and city near Agrigentum, in which were the palace and treasury of Cocalus; the temples of Apollo at Cumæ and Capua, that of Artemis Britomartis, in Crete; the Propylæon to the temple of Hephæstus at Memphis; an altar on the Libyan coast sculptured with lions and dolphins, and many wooden statues of gods and heroes. In naval architecture the invention of the mast and yards is attributed to him, and that of sails to his son Icarus—the fabled wings by which they essayed to cross the Ægean.

Dæn'dels, Hermann Willem, a Dutch commander, was born at Hattem, in Gelderland, in 1762, quitted Holland in 1787 in consequence of a revolution, and in 1793 aided Dumourier with the volunteer corps called *Francs étrangers*. He held important commands in the Republican army until 1803, when he fell under suspicion and left the service. Three years later, however, he was restored by the French King of Holland. He defeated the Prussians, conquered E. Friesland, and was made general of the Dutch cavalry. In 1807 he was appointed governor-general of all the Dutch possessions in the E. Indies. D. ruled Java from 1808 to 1811, and compiled a valuable work, *Staat der Nederlandschen Oost-Indischen Bezittingen*. On the fall of Napoleon, the new King of Holland retained his services, and D. was engaged in colonial government till his death, 2d May 1818.

Daff'odil, or Daffy-down-dilly (a corruption of the Gr. *asphodelos*). It is doubtful if the yellow D. (*Narcissus pseudonarcissus*), now naturalised in Scotland, is a native of that country. It is, however, indigenous to England and most parts of Europe. There are several other species, all natives of southern countries, more particularly of those bordering the Mediterranean. *Narcissus poeticus* is one of the most common white cultivated forms. The rush-D. is *N. triandrus*, another species of the section to which it belongs; the Peruvian D. is *Ismene Amancaes*; the sea-D., *Ismene calathina*. The bulbs are purgative and emetic. For a description of the species see Baker's recent *Synopsis* of the genus (1874).

Dagg'er (Celt. *dag*, 'a point'), a short, pointed, two-edged sword or rapier, used by all peoples from prehistoric times to the present epoch. The broad-bladed short sword of the ancient Greeks may be taken as the type of this weapon of offence, of which almost every country has its own peculiar form. The poniard, dirk, French *miséricorde*, or 'D. of mercy,' Italian stiletto and *anelace* (French *langue de bœuf*), Malay creese or kriss, and Persian *kanjan*, are all varieties of the D. The mark of reference † is called a D. or obelisk.

Daghestan' (Tartar, *Tagh stan*, 'mountainous country'), a province in the lieutenancy of Caucasus, Russia in Asia, on the W. side of the Caspian. Area, 11,040 sq. miles; pop. (1871) 448,299. It is traversed by spurs of the Caucasus. In the valleys good crops of grain are produced, also of silk, saffron, madder, flax, and tobacco. The population is composed of Lesghians, Turks, Tartars, D. Arabs, Armenians, and Jews.

Dagoba, or Daghopa. See TOPE.

Dag'obert I., surnamed the Great, one of the Merwing kings of France. He was born about 600; succeeded his father, Hhlotar II., in 628; warred successfully against Gascons, Bretons, Saxons, and Slavonians; first opposed and then favoured the clergy; reformed the Frankish laws; died at Epinay, and was buried at St Denis, in 638. He was an able but a cruel and licentious king. He is said, after conquering the Saxons, to have caused all those whose stature was greater than the length of his sword to be slain.

Dagöe, or **Dagen**, a Russian island in the Baltic, N. of Osel, and included in the Government of Esthonia, has an area of 420 sq. miles, and a pop. of 10,000. It is separated from Vorms Island on the E. by Mago Sound, and forms, from its rocky character, the chief danger to ships entering the Gulf of Finland. Its capital is Keinis. On the W., the promontory of Dageroit has a lighthouse.

Da'gon (Heb. *dag*, 'fish'), the national deity of the Philistines, resembling in form the body of a fish, with the head and hands of a man (1 Sam. v.). Like the Indian Vishnu and Babylonian Odakon, it was a symbol of water and of the generative and vivifying principles of nature, which produce their effects through the influence of water; for which the fish, with its immense fecundity, was specially adapted. The corresponding female element was the Syrian goddess Atargates (2 Macc. xii. 26) or Derceto. See Layard's *Nineveh*, &c., Stark's *Gaza*, and Selden's *De Diis Syriis*.

Daguerre'otype, a positive photographic process named after M. Daguerre, who, in 1839, made known to the Academy at Paris that photographs of great beauty, in nicety of detail and gradation of light and shade, could be produced by developing by means of mercury the latent image obtained on a sensitive surface of salts of silver. The details of the process are as follows:—A copper plate, coated on one side with a film of silver, is highly polished, and rendered sensitive to light by being exposed in darkness to the vapour of iodine, thus forming an iodide of silver of a reddish-yellow colour. On exposure of the iodised plate in the camera for a short time, a latent image is formed which is developed by the vapour of mercury, which adheres to the parts affected by light, or, in other words, the lights of the picture, while the shadows are represented by the blackened polished metal. The picture is afterwards fixed by immersion in a solution of hyposulphite of sodium. It was afterwards found that the image acquired greater strength and an improved appearance by being coated with a boiling solution of hyposulphite of gold. The most important improvement that has been effected upon the original process is that the silvered plate is rendered extremely sensitive by employing the vapours of iodine and bromine successively. The D. process is now seldom practised in Great Britain.

D'Aguesseau. See AGUESSEAU.

Dahl, Johann Christian Clausen, a Norwegian painter, born at Bergen, February 24, 1788. After residing at Copenhagen, and visiting the Tyrol and Rome, he was chosen Professor of Painting at Dresden, where he died, October 14, 1857. His works consist of powerful landscape and marine paintings. Among others may be mentioned 'Winter in Zeeland,' 'View of Bergen,' 'Scene in the Neighbourhood of Christiania,' and 'Winter Scene on the Banks of the Elbe.'

Dahl'gren, John A., a distinguished officer of the United States navy, was born in Pennsylvania in 1810, rose to eminence during the civil war, and, after the death of Admiral Foote, was appointed to the supreme command of the national fleet. He was admiral of the squadron that blockaded Charleston, and performed most efficient service. D. died at Washington, 11th July 1870. He is perhaps most widely known in Europe through the invention of a cannon called by his name, and which has been introduced into the United States navy. This gun is constructed with a very heavy mass of metal at the breech end; in front of the trunnion it is light. He wrote a *Report on Thirty-two-Pounders* (1850), *Shells and Shell-Guns* (1856), &c.

Da'hlia, a well-known genus of Herbaceous plants belonging to the natural order *Compositæ*, cultivated in gardens for the beauty of its flowers. It is a native of Mexico, and was named in honour of Dahl, a pupil of Linnæus (q. v.), though, owing to the name having been preoccupied by another plant, it is also known, especially on the Continent, by the name of *Georgina*. More than 2000 cultivated varieties of this plant are described, but all are descended from two wild species—viz., *D. superflua* and *D. frustanea*; or, according to some, these two are only varieties of each other, and may be referred to one type, *D. variabilis*. In Mexico the D. grows on sandy meadows 5000 feet above the sea, and though introduced into England in 1789, it was not thoroughly established as a garden plant until 1814. Owing to careful cultivation, its garden varieties have now arrived at great perfection, chiefly by 'artificial selection' and Hybridising (q. v.), and the production of double-flowered forms. In Mexico the bulbs are used as food, and, owing to the quantity of *Inuline* (q. v.) which they contain, are nutritious. In 180c they were introduced into France for that purpose, but on account of their acridity and 'medicinal flavour' were disliked by men and cattle, and the attempt to grow them on a large scale has now been discontinued. Though grown in the open air, the D. is not altogether hardy in this country, being frequently cut down by early frosts, and the tubers have to be taken up and stored away in winter out of the reach of frosts.


Dahlia Variabilis.

Dahl'mann, Friedrich Christoph, a German historian of Swedish descent, was born at Wismar, May 17, 1785. After studying at the Universities of Copenhagen and Halle, he devoted himself to history, the fruits of which were shown particularly in his *Forschungen auf dem Gebiete der Deutschen Geschichte* (Alt. 1822-23), and his edition of the *Chronik von Dithmarsen* (1827). D., who had been appointed secretary to the States of Slesvig-Holstein, allowed himself to be drawn into the arena of politics, and expressing too independent opinions, was refused the promotion he would otherwise have obtained. So he accepted, in 1829, the Professorship of Political Science at Gottingen, which post, however, he resigned when King Ernst suppressed the Hanoverian constitution. D. then lived for a time in Leipsic and Jena. In 1842 he accepted the chair of History in the University of Bonn. The Revolution of 1848 brought back D. to public life. He became the head of the constitutional parliamentary Liberals in the German Diet, and was at one time asked to form a ministry. Foiled, however, by the Reactionary party, he retired finally from political life, and devoted himself entirely to teaching and writing. He died at Bonn, December 5, 1860, leaving unfinished a history of Friedrich II. of Prussia, to which he had set himself during the last years of his life. D. has left behind him many valuable historical works, including *Quellenkunde der Deutschen Geschichte* (1830; 3d ed. 1871); *Geschichte Dänemarks* (3 vols. Hamb. 1840-43); *Geschichte der Englischen Revolution* (Leips. 1844; 6th ed. 1864); and *Geschichte der Französ. Revolution* (Leips. 1845; 3d ed. 1864). See *Biography of D.* by Springer (1870).

Dahomey', a native state of W. Africa, on the coast of Upper Guinea, extends from the Volta river on the W. to Fort Badagry on the E., and has an estimated area of 3960 sq. miles, and a pop. of some 180,000. The country rises in a gently sloping plane for about 200 miles inland to the base of the Kong Mountains, has a rich soil of reddish clay, is watered by many minor streams, and yields cotton, sugar, tobacco, indigo, yams, melons, oranges, limes, pine-apples, and other fruits, and beans, pease, maize, millet, and Guinea-corn in abundance. Wild animals are numerous, including the lion, tiger, elephant, hyæna, the boa, and other reptiles. The inhabitants are a tall, well-made, and warlike, but savage race, partly employed in agriculture, and practising a rude form of fetish-worship made up of ridiculous ceremonials and extensive human sacrifices. All the females in the state belong nominally to the king, and at a grand yearly festival there is a general distribution of wives. The present king has of late years (1876) given great annoyance to European traders. He is said to possess an army of 15,000 troops, of whom 2500 are Amazons, vowed to celibacy, and distinguished for their bloodthirstiness. There are many villages, but the only considerable town is Abomey or Agbome, the capital, situated 95 miles inland from its small port of Whydah. It is surrounded by mud-built walls and by a ditch some four miles in circumference, but only contains some 20,000 inhabitants, the houses being widely scattered within the enclosure. See Burton's *Mission to Gelele, King of D.* (Lond. 1864), and Skertchly's *D. as it is* (Lond. 1875).

Dah'ra, a maritime district of Algeria, between Oran and Algiers, chiefly notable in connection with the horrible massacre by the French of the *Ouled-Riahs*, a Kabyle tribe that fought stubbornly in the revolts of Abd-el-Kader. In June 1845 this tribe, which had sought refuge in some extensive caves, refused to surrender to Colonel Pelissier, who thereupon choked the entrances to their retreat with fascines, and engulfed the whole band, numbering some 800, in a terrible death by suffocation and burning.

Daillé (Lat. *Dallæus*), **Jean**, a French Protestant theologian, born at Chatelherault, 6th January 1594. After finishing his studies at Saumur, he was intrusted in 1612 with the education of the grandsons of Duplessis-Mornay. In 1625 he was appointed pastor and professor at Saumur; the following year he was translated to Paris, where he was a pastor for forty-three years. D. died April 15, 1670. Among his warmest friends were Conrart and Balzac. His masterpiece is his *Traité de l'Emploi des Saints Pères pour le Jugement des différends qui sont Aujourd'hui en la Religion* (Gen. 1632; Eng. trans. 1651), in which he did much to shatter the authority of the fathers. Among his other writings may be mentioned his *Apologie pour les Églises Réformées* (1633; Engl. trans. 1653), and *La Foy fondée sur les Saintes Ecritures* (Char. 1634), and 20 vols. of sermons. Even his adversaries admit his important services to the history of the Church by his learned researches into church antiquities. See *Abrégé de la Vie de Daillé, avec le Catalogue de ses Ouvrages*, by his son, Adrien Daille (Gen. and Par. 1670).

Daily Council was the court which, in Scotland, immediately preceded the institution of the College of Justice (q. v.), and from which the present court derives its title of 'Council and Session.' See COURT OF SESSION.

Daimiel, a manufacturing town of Spain, province of Ciudad-Real, on the Azuar, 20 miles E.N.E. of Ciudad-Real by railway. It has a good Gothic church, an hospital, fine public gardens and promenades; its industries chiefly consist in the production of woollens, linens, blond lace, leather, and pottery. Pop. 12,500.

Dair-el-Kam'ar, or **Deir-el-Kamr**, a town in Syria, on a slope of Lebanon, 12 miles S.S.E. of Beyrout, is the capital of the Druses (q. v.). The inhabitants, who are extremely industrious in cultivating the mulberry, the olive, and the vine, number about 8000. Near D. are the ruins of the palace of the Emir Beshîr, ruler of the Lebanon from 1788 to 1840.

Dai'ry, the department of a farm connected with the production of milk, the manufacture of butter and cheese, and the various industries arising out of the keeping of milch-cows. The word is derived from the old English *dey*, a servant-maid in charge of cows and milk. The D. on a mixed farm is generally a subsidiary concern, cows being kept on such primarily to supply the wants of the family and servants, and for breeding stock for fattening. In certain districts, however, where the herbage and climatic conditions are favourable, D. farming is practised, and the chief aim of the farmer in these cases is the production of milk, butter, and cheese. D. farming is largely practised in Ayrshire and the S.W. of Scotland generally, the S. of Ireland, Holland, Denmark, and Switzerland, and in New York, Ohio, Illinois, and others of the United States. When a D. farm is so situated that its produce can be readily disposed of in large towns as milk, this is generally done, and in such a case the D. operations are much simplified. Some dairies are devoted principally to the production of cheese, and on these the only residual product is whey, which is used for feeding pigs. In the case where butter is the staple, skimmed milk, *i.e.*, milk deprived of its cream, and churned or butter milk—healthy and nutritive beverages—remain. Cheese is made from skimmed milk, but cheese is valuable in proportion to the amount of fat or butter it contains.

Certain breeds of cattle are regarded as especially suitable for D. stock, while others are valued for fattening for the market. In Great Britain the Ayrshire and Alderney cattle are in greatest repute for D. purposes; the former on account of the large quantity of milk they yield on comparatively poor feeding, and the latter for the great richness of their milk, which, however, is small in quantity. The shorthorn breed is highly esteemed at once as good milkers and as kindly fattening stock. On this account shorthorns are preferred by town dairymen, who are obliged to renew their stock frequently, which they do most conveniently by feeding off for the butcher the cows to be withdrawn. Small breeds of cattle are, as a rule, better milkers in proportion to their weight than the larger kinds. See AYRSHIRE CATTLE.

The Byre (q. v.) or cowhouse of a D. farm should be lofty, spacious, well ventilated, and conveniently situated for feeding the animals, removing offal, &c. In the summer and autumn months cows are turned out to the grass parks to feed, and if the 'bite' is good, little more is required; but proper stall-feeding in winter, or when growing grass is not available, is a matter of serious importance. The nature of the food given has a most powerful influence on the richness and flavour of the milk secreted. Cows fed on brewers' grains, or 'draff,' give a large yield of thin, watery, insipid milk; turnip-feeding is at once detected by the strong 'nip' it communicates to milk and butter made therefrom. The winter feeding on a first-class Ayrshire D. farm 'consists in giving each cow in the morning 6 lbs. of hay; at nine o'clock they have steamed food, consisting of cut hay, turnips, bean-meal, and occasionally ground oilcake, or linseed-meal seasoned with salt. At noon each gets 4 lbs. of hay, and at 4 P.M. steamed food as in the morning. In the course of the day each gets 30 lbs. of raw turnips. A stable pailful of steamed food is the measure each gets at a time. During the day they have water between the intervals of meals.' Condimental foods are in favour in some dairies.

The largest yield of milk is secured by frequent milking, and if quantity is aimed at, cows are milked three times a day. When rich milk for butter or cheese is desired, milking twice a day is the rule. The average yield of milk varies within a wide limit, according to breed, feeding, state of health, interval since last calving, &c.; but the yearly average has been stated to range between 4900 and 2400 quarts. It is on record that a cross-bred cow, between a shorthorn and Galloway, gave as much as forty-five quarts a day. A cow not in calf will continue to give milk for several years, but the quantity gradually falls off, and when in calf they become dry several weeks before calving. The milk of a newly-calved cow is always richest in fat, and what is first drawn off is very high-coloured, and known as colostrum or beistyn.

The D. proper, or milk-room, should be a cool apartment, so situated as to be as far as possible kept at a uniform temperature. An essential condition of the very first importance in a D. is the most scrupulous cleanliness of every corner, implement, and operation. There should be nothing to which foreign matter or any noxious odour adheres; marble shelving, glazed dishes and glazed tile-flooring should, if possible, be used, and all wooden implements should be washed and scalded and thoroughly dried before use. Nothing that will communicate any odour should be allowed to come near the milk, as cream quickly absorbs all smells, and reproduces them in the butter made from it. Milk sours and thickens quickly in the summer time, and after thickening, the cream particles become so entangled that they cannot rise to the surface; but with a well-situated D. and suitable milk-vessels, the cream can be secured before this occurs. Cream rises quickest in high temperatures, and when milk is exposed in shallow dishes. When, therefore, cream is to be secured for butter-making, shallow milk dishes are used; but when the manufacture of cheese is the object, the separation of milk in cream is avoided, the milk is poured into deep vessels, and in the best dairies it is gently agitated by working a kind of rake through it. As soon as the milk is brought from the byres it should be passed through a fine mesh sieve to free it from short hairs and any impurities. When the milk is to be creamed, it is poured into the shallow milk dishes, and under ordinary circumstances the whole of the cream will have risen, and be ready to skim off, in from eighteen to twenty-four hours; but in hot weather it is desirable to cream earlier. After the cream has been skimmed off, its butter-making qualities are not injured by its souring, and the frequency of churning is a matter of convenience.

In America a system of co-operative D. working has been in practice for several years, with great advantage as regards economy of labour, certainty of working, and quality of produce. The associated dairies, as they are called in America, are chiefly concerned with cheese-making, and each D. farmer pledges himself to supply milk in certain quantities and of pure quality. A certificate is given to each contributor of milk when his milk

has been measured out and emptied into the tanks. By this system large quantities of milk of uniform quality are kept under the best conditions, and operated on by the most approved methods and apparatus. Such associated dairies have been introduced in Cheshire and Derbyshire, and in Sweden, Switzerland, and other Continental localities. A new D. industry, the preparation of condensed milk, has recently arisen. The milk is evaporated to a certain point by low steady heat, and a proportion of ground sugar added to it. In this form, when put in soldered tins, it will remain sweet and wholesome for a considerable period; and when sufficient water is added, it has the appearance, taste, and qualities of new milk, with only a little additional sweetness. So perfect indeed remains the substance of the milk, that on allowing the condensed milk to stand after dilution, cream forms on its surface.

The manufacture of butter and cheese will be treated of under these heads respectively. (See also CHURN.) The question of the comparative profit and advantage of selling D. produce as milk, or in the form of butter or cheese, is one which entirely depends on situation and local circumstances. Cheese-making is evidently an industry which can only be profitably cultivated on a large scale. See Morton's *Dairy Farming*, Horsfall's *Dairy Management*, and Stephens' *Book of the Farm*.

Da'is (Old Fr. *dais* or *deis*, 'a table,' Low Lat. *discus*), denoted in the middle ages (1) the high table on a raised platform at the upper end of a hall or refectory, (2) the seat on which guests sat at the high table, and (3) the canopy over the whole. The last became the most common use of the term, and thus we read of the D. of a throne, altar, shrine, stall, font, statue, or any object which has a cloth of estate, canopy, or heaven over it.

Dai'sy (*Bellis*; Old Eng. *dæges eage*, 'eye of day'), the name of a genus of plants, plentiful in grassy meadows in Europe, and represented in America by *B. integrifolia*, confined to Tennessee, Arkansas, and the neighbouring regions. In Continental Europe are found some species not native to Britain, but none of such interest as the common D. (*Bellis perennis*), which, under the English name of D., the Scotch *gowan*, the French *marguerite*, &c., has been celebrated by poets in many languages as the emblem of modesty, purity, and fidelity, and as such was worn at tournaments by knights and ladies during the age of chivalry. Among the English poets of the D. are all who have touched upon pastoral subjects, from Chaucer to Burns. The allied genus *Bellium*, comprising five species closely allied to *Bellis*, is found in the S. of Europe. The African D. is *Athanasia annua*; the Australian D., *Vittadenia triloba*; the blue D., *Globularia vulgaris*; the Swan River D., *Brachycome iberidifolia*; the ewe-D. is *Tormentilla*; French D. or Paris D., *Argyranthemum frutescens*; horse-D. and moon-D., *Chrysanthemum Leucanthemum*; Mexican D., *Erigeron* (*Leptostelma*) *maximum*; native D. of New Zealand, *Lagenophora*. The name D.-tree is applied to *Olearia* and *Eurybia*.

Daisy, Michaelmas. See ASTER.

Dako'ta (from 'D. Indians'), a territory in the United States, constituted in 1861, bounded E. by Minnesota and Iowa, S. by Nebraska, W. by Wyoming and Montana, and N. by the Dominion of Canada. Area, 150,932 sq. miles. Pop. (1870) 14,181, exclusive of Indians. It is the advanced post of Western settlers. The Missouri flows through it from N.W. to S.E., and N. Red River flows along its E. frontier into Manitoba. The largest sheet of water is the Mini Wakan, or Devil's Lake. The land is mostly prairie, and in the S. is very fertile, yielding rich crops of wheat, oats, and maize, besides sugar-cane and tobacco. The winters are intensely cold, but the climate is very healthy. The buffalo and deer abound, and the fur trade is valuable. The N. Pacific Railroad intersects D. from E. to W., and has a length in the territory (1875) of 304 miles. The solitudes of the Black Hills have recently (1876) become the busy scene of gold-mining, and coal, iron, and copper are also found. In 1870 the assessed value was $2,924,489; cash value of farms, $2,085,265. Yankton, the capital, lies in the S.E., on the Missouri.

Dakota Indians. See INDIANS, NORTH AMERICAN.

Dalai'-Lama'. See LAMAISM.

Dalamow, or Dalmow, a town in the commissionership of Oude, on the Ganges, 68 miles above Allahabad, with two temples of Siva. Pop. (1872) 5654.

Dalaradia, properly **Dalaraidhe**, a tribe of Picts or *Cruithne* (q. v.), who occupied the southern half of the county of Antrim and the greater part of the county of Down. According to the annals of Tighernach, the founder of the race was Fiacha Araidhe, who lived about the middle of the 3d c. The annals of Ulster distinguish between the Irish and Scottish Picts, calling the former Cruithni, and the latter Picti or Pictores.

Dalberg, or **Dalburg**, the name of an old German family raised to the rank of barons of the empire in the 17th c.—**Karl Theodor Anton Maria, Baron von D.**, born at Herrnsheim, February 8, 1744, was educated at Gottingen and Heidelberg, and studied canon law at Worms. He became chamberlain of that city (an office hereditary in the family from the 11th c.) and Governor of Erfurt. D. died at Regensburg, of which place he was archbishop, February 10, 1817. His reputation stood high as a political ruler, student of science, author, and patron of letters. Among his chief works are *Betrachtung uber das Universum* (Frankf. 1777; 6th ed. 1819); *Von dem Einflusse der Wissenschaften und Kunste in Beziehung auf offentliche Ruhe* (1793); *Grundsatze der Æsthetik* (Frankf. 1791). See Krämer's *Karl Theod. von D.* (Leips. 1821).—**Wolfgang Heribert, Baron von D.** (born 1749, died 1806), brother of the preceding, was the friend to whom Schiller addressed his *Briefe*. See Koffka's *Iffland und D.* (1865).—**Johann Friedrich Hugo, Baron von D.** (born 1760, died 1803), a third brother, was a writer on music and antiquities.

Dalber'gia, a large genus of Leguminous plants, consisting of forest trees and climbing shrubs, natives of the tropics of the Eastern hemisphere. *D. Sisso* of Bengal and the provinces as far N. as the Punjab yields a fine compact timber called *Sissu* or *Sissum*, which, on account of its durability, is employed as sleepers on the Indian lines of railway, in the construction of gun-carriages, for the crooked 'knees' of ships, and for all purposes connected with house-building. *D. sissoides* yields the timber called blackwood and rosewood in Madras, where it is employed in making gun-carriages. *D. nigra* of Brazil supplies much of the 'rosewood' sent to Europe from that country. *D. latifolia*, also called blackwood and E. India rosewood, is the *Sal* (q. v.) of Bengal. *D. monetaria* of Surinam yields a resin not unlike Dragon's Blood (q. v.).

Dalecar'lia, or **Dalar'ne** ('the land of dales or valleys'), an ancient province of Sweden, now included in the lan or prefecture of Kopparberg, of which Falun is the capital. The country is poor and hilly. The name is still dear to the inhabitants from the effective assistance given by the Dalecarlians to Gustavus Vasa in freeing Sweden from the Danish yoke in 1521.

D'Alembert, Jean le Rond. See ALEMBERT.

Dalgar'no, George, was born at Aberdeen about 1626. He was educated in Marischal College, and afterwards at Oxford, where he taught a grammar-school until his death, August 28, 1687. D. invented the finger-alphabet for the deaf and dumb, treating of the subject in *Didascalocophus, or the Deaf and Dumb Man's Tutor* (Oxford, 1680). He also wrote a treatise on a universal language. His writings show great learning, precision, and originality.

Dalhou'sie, Fox Maule Ramsay, Earl of, was born at Brechin Castle, April 22, 1801. He entered the 79th Highlanders in 1819, and, after serving in Canada under his uncle the Earl of Dalhousie, retired as captain in 1831. In 1835 he entered Parliament for Perthshire as a Whig, and sat for this county for two years, and subsequently for the Elgin Burghs (1830-41) and for the city of Perth (1841-52). In 1852 D., hitherto known as Fox Maule, on the death of his father became Baron Panmure, and filled in succession the offices of Under-Secretary for the Home Department, Vice-President of the Board of Trade, President of the Board of Control, and Secretary at War (1855-58). His conduct in the latter post, during the war with Russia, excited a good deal of criticism. D. retired from political life in 1858, when Lord Palmerston resigned. In 1860, on the death of his cousin the Marquis of D., he succeeded to the title of Earl, and

the following year assumed the additional name of Ramsay. D., who had married in 1831 the Honourable Montagu Abercromby, eldest daughter of the second Baron Abercromby (died 1853), died July 6, 1874, without issue, and has been succeeded by his cousin, George Ramsay, 12th Earl of D., born April 12, 1806. Outside of politics, D. will be chiefly remembered for his devotion to the Free Church of Scotland, his last public act being to second, in 1874, the nomination of Dr Rainy to the Principalship of the Edinburgh New College.

Dalhousie, Marquis of, James Andrew Broun-Ramsay, one of the most energetic Indian administrators that Great Britain has produced, was the third son of the ninth Earl of D., and was born at Dalhousie Castle, April 22, 1812. Educated at Harrow and Christ Church, Oxford, D. in 1832, by the death of his only surviving brother, succeeded to the honorary title of Lord Ramsay, and as such contested, although in vain, in 1835 the representation of Edinburgh in the Conservative interest. In 1837 he entered Parliament for Haddingtonshire; but his father, who had been Governor of Canada, dying the following year, D. became a member of the House of Peers. In 1843 he showed his vigorous administrative powers and his industry as Vice-President of the Board of Trade under Sir Robert Peel, and still more so two years later as chief of the same department in the time of the railway mania. In 1847 he succeeded Lord Hardinge as Governor-General of India, and arrived at Calcutta, January 12, 1848. At once D. threw himself heart and soul into the work of improving the internal administration and developing the resources of India. He established roads, lines of railway, telegraphs, and irrigation works on a vast scale; reformed and cheapened the postal service; improved the system of education, and placed the various sects in the country on a more rational footing towards each other. Above all, he extended the Indian empire of Britain, conquering Pegu and the Punjab, and annexing several great dominions, the chief of which was Oude. Whether the policy of the 'great annexer' was always wise has been seriously doubted, and many believed that the Indian mutiny during the rule of his successor was to be traced to this policy, which has been described by a French critic as *brusques et précipitées.* But it was heartily approved of by the English nation. In 1849 he was made a marquis, and obtained the thanks of both Houses of Parliament and of the East India Company, and in 1852 he was appointed Constable of the Castle of Dover and Warden of the Cinque Ports. His health, however, gave way before he left Calcutta in 1856, and, after a long and painful illness, he died at Dalhousie Castle, 19th December 1860. D. married in 1836 the eldest daughter of the Marquis of Tweeddale. She died in 1853, leaving no male issue, and the title of marquis became extinct, the earldom reverting to D.'s cousin, Baron Panmure. See *History of the Marquis of D.'s Administration of British India* (2 vols. Lond. 1863-64).

Dal'ias, a town in the province of Almeria, Spain, 18 miles W.S.W. of Almeria, in the neighbourhood of mines of lead and antimony. Pop. about 9000. Agriculture, mining, and fishing are the other industries. The principal buildings were destroyed by an earthquake in 1804. There are favourite mineral baths on the seaside near the town.

Dal'keith (Gael. *dal,* 'a field,' and *caeth,* 'narrowness,' 'narrow field;' or from *cath,* 'battle,' 'field of battle'), an ancient market-town and burgh of barony, 6 miles S.E. of Edinburgh, between the N. and S. Esks, consisting principally of one long street. The fine old Gothic parish church dates from the 16th c. There are several handsome churches belonging to different denominations, and an Episcopal chapel built by the Duke of Buccleuch within the grounds of D. Palace. The palace was erected about 1700, on the site of a very old castle, once termed the Lion's Den, from the haughty Earl of Morton having resided in it. The estate of D. was purchased from Morton by Buccleugh in 1642. One of the largest grain-markets in Scotland is held at D. The town has manufactures of woollens and brushes, besides tanneries and iron-foundries, and there are valuable coal-mines in the neighbourhood. Pop. (1871) 6386. See Scott's *Provincial Antiquities.*

Dall'as, George Mifflin, an American diplomatist, was born at Philadelphia, July 10, 1792. After a brilliant career at Princeton College, he spent a short time in a subordinate diplomatic post at St Petersburg, and then settled down to the practice of law in his native city, where he filled several important offices, including that of district-attorney of Philadelphia. In 1837 he was appointed United States minister at St Petersburg, but was recalled in two years. From 1844 to 1849 he held the office of Vice-President of the United States. In 1856 he became minister at the British court, and was intrusted with the settlement of the Central American question. In this capacity he gained the respect of all with whom he came in contact, was an especial favourite with Lord Palmerston, and diligently studied the political institutions of England. D. was succeeded in 1861 at the court of St James by Mr C. F. Adams. He died December 31, 1864.

Dalles' (Fr. *dalle,* 'a flagstone'), the name given by the French *voyageurs* to the rapids on the Columbia or Oregon river, forming, along with the cascades, magnificent scenery, but formidable obstructions to navigation. In the D., lofty walls of basaltic rock rise from either side, leaving a narrow passage, at one point only 58 yards in width, through which the angry waters rush with fearful rapidity.

Dalma'tia, the most southerly crown-land of Austria, lies along the N.E. coast of the Adriatic, and is hemmed in on the land side by Croatia, Bosnia, and Herzegovina. Area, 4881 sq miles; pop. (1869) 456,961, of whom nine-tenths are Slavs (Morlaks of Servian descent), 30,000 Italians (mostly in the towns), and some 300 Jews. It consists of a strip of land 260 miles long, and having an extreme breadth of 60 miles. The coast, abounding in magnificent natural harbours, is surrounded by a fringe of islands, most numerous in the N. and largest in the S., of which the principal are Brazza (q. v.), Lissa (anc. *Issa*), Lessina (*Pharos*), and Curzola (*Black Korkyra*). D. is divided into thirteen districts—Benkowacz, Cattaro, Curzola, Imoski, Knin, Lesina, Macarsca, Ragusa, Sebenico, Sinj, Spalato, and Zara. The mainland, nestling between the Dinaric Alps (q. v.) and the sea, is watered by few rivers, the largest being the Cettina, Kerka, Termanja, and Narenta. Its surface is in great part swampy, while one-ninth of it is covered with forest; only 18 per cent. is cultivated, yielding chiefly maize and barley. There is also an extensive cultivation of the vine and olive, and among the fruits are the fig, almond, and hill-cherry. Along the coast is found the richest algæ vegetation in all Europe. The climate of D. is hot but healthy, unless in the swampy regions, where fever prevails during certain seasons. The mean temperature is 62·5° Fahr., while its range is from 19° to 95°. D. has valuable coast-fisheries of anchovy, mackerel, and tunny. With fine pastures, it is celebrated for its sheep-farming, but the wool is little exported. In 1872 it had 673,605 sheep, and also 280,656 goats, 16,975 horses, and 26,322 swine. D. produces large quantities of Maraschino, as well as some forty other kinds of dessert wines. In various parts of the mainland and archipelago asphalt is found, and there are iron and coal mines. Zara is the capital, and the other great trading places are Spalato, Cattaro, and Ragusa. D. sends five deputies to the Reichstag, and has a Landtag of its own, consisting of forty-three members. The Roman Catholic Church has an archbishop at Zara, and in D. the number of its adherents amounts to 377,121; the members of the Greek Church number 78,305. The Slavs speak the dialect of Herzegovina. As a race, the Dalmatians are intelligent and handsome; the untutored Morlak is bold, independent, and cunning. D. is first known as a 'ledge of Hellenic land,' protected by its hills from the native barbarians of Illyricum. It was conquered by Augustus 23 B.C., becoming the S. part of the province of Illyricum. In 489 it was captured by the Goths, and in turn by the Slavs (620). Towards the end of the 9th c. the coast-land fell into the hands of the Croatian princes, one of whom, Cascimir Peter, took the title of King of D. (1052). On the extinction of this dynasty (1100), King Ladislaus of Hungary seized part of the territory, while the other portion placed itself under the protection of Venice. By the peace of Passarovitz, 1718, Venice ceded a small piece of D. to Turkey, and by the peace of Campo-Formio, 1796, Venetian D. was transferred to Austria. In 1805 Napoleon annexed part of D. to the kingdom of Italy, and in 1805, having also captured Hungarian D., he united the parts, thus forming the province of Illyria. It again became Austrian in 1814, and was made a crown-land in 1816. See the works of Peter (2 vols. 1857) and Noë (1870).

Dalmat'ic (Lat. *tunica Dalmatica*, from Dalmatia), the characteristic dress of deacons in the early Christian Church, is a tunic extending to the knees, with long wide sleeves open at the sides, and ornamented with two purple stripes, the *angusti clavi* of the Roman dress. The simpler and older form was the *colobium* (Gr. *kolobos*, 'short'), which had only very short sleeves. When the other clergy began to wear the Chasuble (q. v.) the D. was conceded to the deacons, as more elaborate than the colobium, because they had nothing over it, although it was reserved for those at Rome till about the 10th c., when it became generally the proper dress for deacons. See Walcott's *Sacred Archæology* (1868), and Marriott's *Vestiarium Christianum*.

Dalri'ada. In the 3d c. Cairbre Ruighfhadu—*i.e.*, 'Cairbre of the long arm,'—a prince of Munster, removed to Ulster, where his posterity attained considerable power. Bede calls him Reuda, other historians Riada. In 506 a band of his descendants, numbering 150, and led by Loarn, Angus, and Fergus, three sons of Erc, crossed to the opposite coast of Argyleshire, and took possession of Kintyre and Knapdale, founding the very small 'kingdom of D.' In course of time they conquered the whole mainland of the county as far as Drumalban or the modern Tyndrum. The northern Picts or Caledonians maintained an almost constant warfare with them, and in the 8th c. appear to have utterly defeated them (having burned their capital, Dun-Add, near Loch Crinan, to the ground). Their history from the following century is involved in great obscurity, but at the close of that period, their leader, Kenneth MacAlpine, appears as king alike of D. and of the northern Pictland. It is believed that he acquired the new territory by inheritance through his mother. He proved to be a man of great ability, subdued both the Strathclyde Britons and the southern Picts, thus reducing Albainn (as it was then called and is still known to all Gaelic speakers) under one sceptre, and eventually imposing on it the name of Scotia or Scotland.

Dalry' (Gael. 'king's field,' or 'level field'), the name of several places in Scotland, of which the most important are—1. A town of Ayrshire, on the right bank of the Garnock, 19 miles S.W. of Glasgow, and a station on the Glasgow and South-Western Railway. It owes its prosperity to the development of its extensive coal, lime, and iron fields. There are numerous blast-furnaces in the neighbourhood. There is also a large woollen-mill, giving employment to numerous hands. Pop. (1871) 5214. 2. A village in Kirkcudbrightshire, Scotland, on the river Ken, 15 miles N.N.W. of Castle-Douglas. Pop. (1871) 637, as against 639 in 1861.

Dalrym'ple, an ancient Scottish house, which takes its name from the estate of D. in Ayrshire, which it held in the 14th c. The family came into notice in the 15th c. for adherence to Lollardism, and **John D. of Stair** was among the first Scottish gentlemen who embraced the Reformation doctrines. His son, **James D. of Stair**, was a firm supporter of the Scottish Reformation of 1560.—**James D., Viscount Stair**, grandson of the last, was born at Drummurchie, Ayrshire, May 1619. He studied at Glasgow University, became captain in the army raised to vindicate the Covenant (q. v.), and in 1641 was made Professor of Logic in Glasgow, an office which he resigned before his call to the bar in 1648. A Presbyterian and a Royalist, he was in 1649 appointed Secretary to the Commission sent to Holland by the Scottish Parliament to invite Charles II. to accept the crown, a mission in which D. showed considerable tact. In 1657 he was made a judge under the Cromwellian rule, an office in which he was confirmed at the Restoration, and which he offered to resign in 1663 rather than sign the Declaration Oath. In 1664 he was made a baronet, in 1671 Lord President of the Court of Session, and during the next ten years occupied himself in composing *Institutions of the Law of Scotland*. In 1681 he procured the insertion in the Test Act of a clause which rendered the Act contradictory and invalid. The persecution to which he was henceforth subjected forced him in 1682 to withdraw to Leyden, where he occupied himself mainly with philosophy until 1688, when he sailed for England with William of Orange. He was reappointed President of the Court of Session, was raised to the peerage, and was the King's chief adviser in Scottish affairs. He died at Edinburgh, November 23, 1695. He was a man of great sagacity and learning, of sincere but unimpassioned patriotism, of amiable but almost phlegmatic temperament. His chief works are his *Institutions of the Law of Scotland* (1681), on which his reputation mainly rests, and his *Physiologia Nova Experimentalis* (Leyd. 1686), in which he sought to overthrow the Copernican theory.—**John D., First Earl of Stair**, eldest son of the above, was born in Wigtonshire in 1648. He became an advocate, and defended Argyle in his trial for treason. In 1686 he was made Lord Advocate, in 1688 Lord Justice Clerk, and in 1691 Secretary of State. His memory is stained by his complicity in the Massacre of Glencoe (q. v.). He became Viscount Stair in 1695, was made Earl of Stair in 1703, was largely occupied in preparing the way for the Act of Union, and died January 8, 1707.—**John D., Second Earl of Stair**, son of the first Earl, was born at Edinburgh, July 20, 1673. Having accidentally shot his elder brother, he was educated away from home. He studied at the Universities of Leyden and Edinburgh, fought as a volunteer under the Earl of Angus in 1692, was aide-de-camp to Marlborough during the campaign of 1702, in 1706 became commander of the Cameronian Regiment and the Scots Greys, and distinguished himself at Oudenard, Malplaquet, and Ramilies. He became Earl of Stair in 1707, and in 1718 went as British ambassador to Paris, where he skilfully counteracted Jacobite intrigues, but whence he was recalled in 1720, owing to his quarrel with Law, the Minister of Finance. He lived in retirement at Newliston near Edinburgh until 1742, when he was made commander of the British troops in Flanders, and was present at the battle of Dettingen (1743). He died at Edinburgh, May 9, 1747. He was an able diplomatist and soldier. St Simon characterised him as 'extravagant, ardent, and ambitious.' See Graham's *Annals of Viscount and First and Second Earls of Stair* (Edinb. 1875).

Dalrymple, Sir David, a famous Scottish judge and author, the son of Sir James D. of Hailes, and great-grandson of the first Lord Stair, was born at Edinburgh, October 28, 1726. He was educated at Eton, and at the Universities of Edinburgh and Utrecht; was called to the bar in 1748, and won considerable reputation as a pleader; in 1766 was made a judge of the Court of Session, with the title Lord Hailes; and in 1776 was nominated one of the Lords of Justiciary, which office he held till his death, November 29, 1792. D. was a man of admirable character and varied acquirements. Amid his judicial labours he was a voluminous author of works displaying at once profound learning and the graces of an Attic style. Among his works are *A Discourse on the Gowrie Conspiracy* (1757); *Memorials and Letters Relating to the History of Britain in the Reign of James I. of England* (1762); *Memorials and Letters Relating to the History of Britain in the Reign of Charles I.* (1766); *Historical Memoirs Concerning the Provincial Councils of the Scottish Clergy* (1766); *Remarks on the History of Scotland* (1773); *Remains of Christian Antiquity* (1776-80); *Disquisition Concerning the Antiquity of the Christian Church* (1783); *Annals of Scotland, from the Accession of Malcolm III., Surnamed Canmore, to the Accession of Robert I.* (1776); *Annals of Scotland, from the Accession of Robert I., Surnamed the Bruce, to the Accession of the House of Stuart* (1779). He also edited various early Scottish poems, &c.—**Alexander D.**, a Scottish geographer, brother of the preceding, was born at New Hailes, near Edinburgh, July 24, 1737. He was educated at Haddington, and in 1752 was sent to Madras as a writer in the service of the East India Company. The study of documents on the commerce of the Eastern Archipelago prompted him to resign his post and sail for these islands, with the view of creating a lucrative traffic. At Sulu, he made a favourable commercial treaty with the Sultan, but his projects were ruined by the outbreak of smallpox among the natives. He revisited England in 1765 to ventilate his mercantile scheme, which the Government would not embrace; went back to Madras as a member of council in 1775, returned to England in 1777, was appointed hydrographer to the East India Company in 1779, and died at Marylebone, June 9, 1808. He wrote a large number of geographical treatises, political pamphlets, &c.

Dal'ton, a town in Furness, Lancashire, 16 miles W.N.W. of Lancaster, connected with both the Lancashire and Cumberland railway systems, and not far from the magnificent ruins of Furness Abbey. There are iron-foundries in the vicinity, and a considerable trade is carried on in the malting of grain. Pop. (1871) 9310. Romney, the painter, was a native of D.

Dalton, John, was born at Eaglesfield, in Cumberland, September 5, 1766. In 1781 he removed to Kendal, where he

became an usher in his cousin's school, and began a series of meteorological records which he continued with the greatest regularity to the day before his death. In 1793 he obtained the chair of Mathematics and Natural Philosophy in the New College, Manchester, became a member of the Literary and Philosophical Society in that city, and shortly afterwards contributed his first paper on some *Extraordinary Facts Relating to the Vision of Colours*. It was suggested by his inability to distinguish certain colours—a peculiarity which is known as *Daltonism* (q. v.), and which seems to have been due to the yellowish tinge of the refractive matter of his eye. In the *Manchester Transactions* for 1802 several other papers appear by him, bearing upon meteorological subjects, upon evaporation, and upon the relations subsisting between the pressure volume and temperature of permanent gases. From these is deduced D.'s law that the pressure of a gas at constant volume is proportional to the temperature, which, together with other important principles there laid down, has greatly aided the experimental determination of the specific gravity of gases. Many other valuable contributions to science are to be found in the *Philosophical Transactions*, in Thomson's *Annals of Philosophy*, and in Nicholson's *Philosophical Journal*. In 1793 appeared his *Meteorological Essays* (2d ed. 1834). In 1803 D. began the working out of his atomic theory, an outline of which was given in the third chapter of the first volume of his *New System of Chemical Philosophy* (1808), while a further development and application appeared in the second volume of the same work, two years later. In 1817, he became President of the Manchester Literary and Philosophical Society, and in 1821 was elected a Fellow of the Royal Society, from which he received a gold medal in 1826 for his scientific discoveries. In 1827 the third volume of the *New System of Chemical Philosophy* was published, the most important part of which is the appendix, in which he treats with his characteristic sagacity of various thermal properties of gases. At the second meeting of the British Association at Oxford in 1832, the University conferred upon D. the degree of D.C.L., and at the Edinburgh meeting in 1834 he was made LL.D. In 1833 D. received from Government a pension of £150, which in 1836 was increased to £300. D. died at Manchester, July 27, 1844. The present development of the atomic theory, with which D.'s name must ever be associated, is given under the article ATOMIC THEORY. D.'s merits as a chemist were as fully appreciated on the Continent as in his native country. He was a foreign Fellow of the Institute of France, a member of the Academy of Sciences of Berlin and Munich, and of the Natural History Society of Moscow.

Dal'tonism. Certain individuals are more or less deficient in the power of discriminating colours. This is D, from the name of the distinguished chemist who was himself the subject of it. It is sometimes termed colour-blindness. The most common form of D. is an inability to distinguish red from green,—thus ripe cherries can be distinguished from the leaves of the tree only by their form. In other cases blue and green are confounded. In most cases, the colour-blindness is for the red rays. Frequently low tones of colour give rise to the same sensation as certain mixtures of black and white—producing grey. D., in all probability, depends on some peculiarity of the structure of the retina. It is well-known that the periphery of the retina shows defective perception of the different colours—red appearing grey; green, blue; green, yellow, &c.; and it would appear that D. is 'only an extension of the want of perceptivity, normal in the periphery of the retina.'

Dalziel', Thomas, of Binns, W. Lothian, a Scottish general, born about 1599. He took the royal side in the civil war, and held the town of Carrickfergus for the King; was a major-general at Worcester, where he was captured, but escaping from prison, he entered the service of the Czar of Muscovy, and distinguished himself in the wars against the Turks and Tartars. In 1665 he returned to Scotland, and was appointed commander-in-chief of the forces there. On the 28th of November 1666 he suppressed a rising of the Covenanters at Pentland, with more humanity than might have been expected from a man of his ferocity of temper, intensified by Russian service and a fanatical loyalty to his King. After the execution of Charles I. he never shaved his beard, which grew down to his middle, and this, coupled with his antique dress, never failed to gather round him a crowd of boys when he appeared in London. D. died in 1685.

Dam'ages, in law, is the pecuniary recompense due to one person who has sustained loss or injury through the fault of another. In England, an action for D. can only be brought before the Common Law Courts (q. v.), as the Court of Chancery (see CHANCERY, COURT OF) will not interfere when a plaintiff can have his remedy at common law. Every illegal, unwarrantable, or malicious act, whether fraudulent or not, by which another is injured in his worldly interest, in his person, or feelings, founds a civil claim for D. against the person who has caused the loss or injury. D. for breach of contract are only due when it is impossible to enforce specific performance, and even when a specific penalty is annexed to failure, so long as performance is possible, the debtor in this obligation is not entitled to pay the penalty, and so get quit of the obligation. Where a particular subject has been lost, destroyed, or injured, without criminality on the part of the person culpable, the person sustaining the loss is only entitled to D. according to the real value of the loss, not according to the sentimental value which he may attach to the subject. But if the culpable person has criminally caused the injury, the sufferer, in estimating D., is entitled to have weight given not only to the value of the subject sentimentally, but to possible consequences. A master is civilly liable for the negligence of his servants or others employed by him. Formerly, in England, no action for D. was maintainable against a person who by wrongful act or negligence caused the death of another, though the offender was liable if the sufferer was only hurt, but this defect of law has been remedied by Lord Campbell's Act, which provides that any one who has wrongfully or neglectfully caused the death of another shall be liable in D., even though the circumstances of the act make it felony. The action is only competent to the wife, husband, parent, or child of the person killed.

Dam'aging Manufactures, Machinery, or Mines. The Act 24 and 25 Vict. c. 97, enacts special penalties, ranging from two years' imprisonment to penal servitude for life, for these offences.

Daman', a fortified seaport of Guzerat, India, at the mouth of a river of the same name. Pop. 6000, many of whom are employed in shipbuilding. Ships in the harbour are safe from the S.W. monsoon, and outside the bar there is good anchorage. Endemic fevers prevail, caused by the brackishness of the water. D. belongs to the Portuguese.

Daman, or sometimes **Hyrax** (*Hyrax*), an anomalous genus of mammalia, a distinct order (*Hyracoidea*), and sometimes regarded as included, from certain resemblances in the teeth, in the family *Rhinocerotidæ*, or that of the Rhinoceroses. Even in the character of its placenta (which is zonary and deciduate) it differs from the *Rodentia*, with which order it has also been supposed to possess structural relations. Hence the genus D. stands as the type of a somewhat aberrant group of mammals, intermediate between the *Ungulata* or hoofed mammals on the one hand, and the Rodents and *Insectivora* on the other hand.

The genus D. is represented by several species, of which the *H. Syriacus* of Syria (supposed to be the 'cony' of Scripture), and the *H. Capensis*, 'Klip Das,' or 'Cape Badger' of S. Africa, are the best known. The H. of Syria is a small rabbit-like animal, the front feet having four, and the hind feet three toes. The nails are flat. The body is covered with fur, and the snout is divided as in Rodentia. There are four teats in the groin and two in the axillæ. From twenty-nine to thirty-one dorso-lumbar vertebræ exist, a number rarely exceeded in mammals. The adult has eight incisors, no canine teeth, sixteen premolars, and twelve molars. The outer upper incisors are small, but the inner large and curved, and grow throughout life. They are coated in part with enamel, like the incisors of rodents. The molars resemble those of the rhinoceros. The uterus is two-horned. The Syrian H. is of dark-brown colour, and the Cape H. wants the long black hairs of the former. No clavicles exist, and the tail is rudimentary.

Damar', a town of Yemen, Arabia, 120 miles N.N.W. of Aden, with 5000 well-built houses, the governor's castle, and a college for the Zeïtes, which is well attended.

Damasce'ning, Damaskee'ning, Dam'asking, terms employed indiscriminately to denote the production of distinct styles of artistic ornament on iron, steel, &c., and derived from Damascus, where the manufacture of Damasked Steel (q. v.)

attained great celebrity. D. is an entirely different process from that by which damasked steel is produced, being the inlaying of gold or silver threads in incisions, representing some design under-cut in metal. The threads are worked in with a blunt tool, and the whole afterwards filed and burnished. This art was successfully practised by the ancients, and during the Renaissance in Italy, Germany, and Spain, arms and armour were so enriched. Indian gold D., called *koftgari*, and produced chiefly in the Punjab, possesses great artistic excellence.

Damasce'nus, Joannes, afterwards surnamed **Chrysorrhoas** ('Golden Stream'), from his eloquence, was born at Damascus about 700 A.D., became a monk of St Sabas near Jerusalem, and died about 760. He was the last theologian of the Greek Church, and his writings form the starting-point of systematic theology. His best-known work is *De Fide Orthodoxa*, a complete system of theology derived from the fathers. D. sought to propagate the Aristotelian philosophy, but, like most ecclesiastical writers of the times, was extremely credulous and untruthful. He has been canonised both in the Greek and Latin Churches. The best edition of his works is that by P. Mich. Lequien (2 vols. Par. 1712).

Damas'cus (Turk. and Arab. *Dimishk è Shâm*), one of the oldest cities in the world, and the capital of Syria, Asiatic Turkey, lies in the delightful plain of Chutah, at the E. base of Anti-Libanus, and at an elevation of 2238 feet above the sea. It is surrounded by gardens and orchards for a circuit of some 30 miles, and in its approach it has a splendid appearance. 'Tapering minarets and swelling domes tipped with golden crescents rise up in every direction from the confused mass of white terraced roofs, while in some places their tops gleam like diamonds amid the deep-green foliage.' The Barrada (the Abana of Scripture) flows past D. in an easterly direction, to be joined by the Pharpar (mod. *Phega*) in the Bahr-el-Merj. The city is enclosed by dilapidated walls, dating chiefly from Roman and Arabic times. Its streets are gloomy and narrow, and are made hideous by uncared-for refuse-heaps and stagnant pools, and still more by crowds of vagrant, ravenous dogs. The 'street called Straight' (Acts ix. 11) runs about a mile from E. to W., and is the most spacious where all are miserably narrow. The private houses are generally mean, prison-like structures of grey mud, but the interiors of those of the better class are furnished and adorned with the most lavish magnificence. The principal public building of D. is its famous Grand Mosque, originally a Semitic shrine or temple. According to Fergusson, it is impossible to make out its original form in consequence of so much Moslem and Christian rebuilding. It occupies one side of a great square (163 by 108 yards), and the interior is portioned into nave and aisles by rows of Corinthian columns, supporting the roof in the style of the old basilicas. The quadrangle is entirely paved with tesselated marble, and is ornamented with beautiful fountains. An hospital for the sick is attached to the Mosque. Another notable building, the Great Khan, consists of alternate layers of black and white marble, and has a graceful cupola, supported on granite pillars. There is also an extensive citadel, an imposing serai or palace, besides 248 minor mosques, and many monasteries, bazaars, caravanserais, baths, cafés, &c. D. has now but a tithe of its once famous manufactures of silks, cottons, cloth of gold, jewellery, cabinet-work, leather, horse-trappings, sword-blades (see DAMASCENING), &c. It is still, however, a great centre of the caravan trade, and receives from Britain calicoes, hardwares, sugar, &c., to the value of some £200,000 yearly. The September pilgrimage to Mecca, which has a strongly commercial as well as a religious character, is under Government protection, and costs the treasury £70,000 yearly. Consisting formerly of as many as 60,000 persons, the caravans have greatly fallen off since the opening of the Suez Canal. The pop. of D. is estimated at from 120,000 to 150,000, of whom five-sixths are Mohammedans, 15,000 Christians, 45,000 Jews, and 4000 Druses (q. v.). The last of these occupy a quarter of the city by themselves. D. is a city of unknown antiquity. It is alluded to in Genesis xiv. 15, and for a long period was closely connected with the kingdoms of Israel and Judah. It was in the possession successively of the Assyrians, Babylonians, and Persians. Under the Persians it was made capital of the province of Syria, but it fell into the hands of Alexander the Great after the battle of Issus. During the long wars of the Seleucidæ and the Ptolemies, D. had no separate history, belonging sometimes to the one power and sometimes to the other. The Romans under Pompey subdued Syria, and made D. the capital of the province of Syria, 64 B.C. In 633 it was seized by the Calif Omar; in 1401 Timur partly destroyed it by fire, and in 1516 it was taken by the Sultan Selim I. It has ever since remained in the hands of the Turks, except during an interval of eight years (1832-40), when it was under the rule of Ibrahim Pasha. In 1860 the Druses broke loose upon the Christians, killing some 4000, and carrying off many of the women as prizes for the harem. The French macadamised road was opened between D. and Beyrout in 1863. See Porter's *Five Years in D.*, Addison's *D. and Palmyra*, Pococke's *Description of the East*, also article SYRIA.

Dam'ask, a woven fabric in which elaborate patterns of foliage, flowers, wreaths, scrolls, &c., are introduced, said to have been first made at Damascus. The production of the pattern depends on the arrangement of the weft and warp yarns in twill-weaving, the gloss or lustre on the weft being distinct from that of the warp threads, which run at right angles to them. In D. weaving, the design for the fabric has first to be prepared and drawn on 'point' paper, that is, paper ruled into small squares which correspond with the threads in the web. The weaving is done in the Jacquard machine (see JACQUARD), previous to the invention of which, about the beginning of the present century, the weaving of D. was effected by a very cumbrous and tedious process. Damasks are chiefly made in linen, and used for toilet and table covers, napkins and towels, but woollen fabrics and silks are also similarly woven, and used principally for furniture cloths. In furniture damasks the pattern is sometimes produced by the use of different colours, and a cheap D. for furniture and hangings is now made of a union of cotton and woollen yarns. The chief British seats of the linen D. manufacture are Belfast in Ireland and Dunfermline in Scotland, that being the staple textile industry of these two towns.

Damasked Steel. When steel presents a 'watered,' waved, contorted, or fibrous surface, as in the highly-prized Damascus blades, it is spoken of as *damasked*. The peculiar markings are due to the crystallisation of the iron and carbon from particular treatment in cooling. Carbon is present in excess of the ordinary proportions, and by the action of acids on the metal of unequal composition, and consequently of varying degrees of solubility, patterns of a certain order may be strengthened. The finely-watered blades of Indian manufacture are made of 'wootz,' or Indian steel, and different qualities of iron, forged into bars, welded, spirally twisted, and beaten out flat. The blades are said to be hardened by being fixed while redhot to a wheel put in rapid motion. Very successful imitations of the real 'damask' have been produced by French manufacturers. Grey, black, and brown 'damasks' result by mixing quantities of platinum, silver, and palladium with the steel.

Dam'asus, a Spaniard, succeeded Liberius as Bishop of Rome, 366 A.D., after a sanguinary contest with Ursinus. He was active in suppressing Arianism and also Apollinarianism, for which purpose he held several councils and wrote a number of letters. His zeal was also excited against the Luciferians (q. v.), the Donatists (q. v.), and the Priscillianists (q. v.). In return for this his own private character was, rightly or wrongly, attacked. An edict of Valentinian's, that the clergy should not receive legacies from pious ladies, was said to have been aimed principally at him, and he was directly charged with immorality before a council held at Aquileia, but was acquitted. From 382 till his death in 384, he had Jerome (q. v.) for his secretary, who was engaged at the time on his version of the Bible. See Gibbon's *Decline and Fall of the Roman Empire*, chap. xxv.

Dambul', a village in Ceylon, 45 miles N.W. of Kandy, named from a vast rock-temple of Buddha, containing carvings of Buddha, one of which is of colossal size.

Dame (Fr. *dame*, Lat. *domina*, 'the mistress of the house'), a title of honour formerly given in England to a *lady*, understanding the latter term as the correlative of *gentleman*. It is now little used in England, but is applicable to married women of all classes. *Madame*, shortened into *madam*, is still used on special occasions, and in ceremoniously addressing a lady in a letter; but it is not now the custom in England, as it was in former times, for ladies and gentlemen in addressing a lady orally

to say *madame*, or *ma'am*. In France, again, it is considered discourteous to omit the title in addressing a married woman, whatever be her social rank. In Spain, it is proper to address a lady or a gentleman in the third person, by a term perhaps equivalent to 'your honour' in England. In France, the Virgin Mary was styled by way of pre-eminence *Notre Dame*.

Dame's Violet (*Hesperis*), a genus of plants of the natural order *Cruciferæ*, natives of the middle and S. of Europe. The common D. V., or white rocket (*H. matronalis*), is found apparently wild in Britain, but is doubtless an escape from the many cultivated varieties. Its flowers are scentless by day but perfumed at night. It is cultivated in pots in Germany, as it was at one time in England; hence its name. Another species, *H. tristis* (the night-scented rocket), is a favourite house-flower in parts of the Continent.

Dam'iens, Robert François, was born at Tieulloy, in Artois, in 1715. His youth, passed in service, was so vicious that he earned the sobriquet of *Robert le Diable*. On account of a robbery he was compelled to seek refuge in Belgium, and there, in 1756, took his resolve to assassinate Louis XV. On the 5th of January of the following year, he stabbed the King while he was leaving Trianon. D. was instantly captured. During his trial he behaved with great coolness; on hearing the sentence he only said, 'It will be a rough journey.' After frightful tortures he was put to death, March 28, 1757. His motive for the murder could not be determined. The people accused in turn the Jesuits, the Jansenists, the Dauphin, and the Parliament, of complicity in the crime; but the assassin revealed nothing. See *Pièces orig. et procéd. du Procès fait a Rob. Franç. D.* (Par. 1757), and *Vie de Rob. Franç. D.* (Par. 1757)

Damiett'a, called by the natives **Damiah**, Arab. *Dimiat* (anc. *Tamiathis* was four miles lower down), a seaport of Lower Egypt, about eight miles from the mouth of the eastmost branch of the Nile. The mouth of the stream is protected by two Martello towers with circular batteries. In the 13th c. it began to be a flourishing place, and was long famous for its manufactures of leather and cloth (it gives name to 'dimity'); but its industrial activity has long declined, and its formerly flourishing commerce has been absorbed by Alexandria. Rice and flax of excellent quality are extensively grown in the district, and there is some trade in the former and in fish. Pop. (1872) 29,383.

Damm'ar, an Oriental word signifying resin, applied in commerce to varieties of resinous substances. The gum-D. or D. resin of British commerce is, however, the produce of pine-trees, to which the generic name D. has been given. The chief of these, and the principal source of the D. of our market, is the Amboyna pine (*D. orientalis*), a tree growing to a height of 200 feet, found in the East Indian Archipelago. It produces a beautiful, almost colourless, transparent resin, which constitutes the best portion of the resin imported as Singapore D. The Kauri pine of New Zealand (*D. Australis*) is the source of the gum-Kauri or New Zealand D. of commerce. The tree now flourishes only in the North Island, but the resin is found in many places in a fossil condition. It is only the fossil gum which is of commercial value. It forms considerable mounds, to which annual additions are made by exudations round the trunks of living trees. Other species of Dammara in the Pacific Islands yield similar resins. Along the skirts of the Himalayan Mountains in India there exist immense forests of a valuable timber tree, *Shorea robusta*, which yields a resin called Sal D., but this is not like the dammars found in Western commerce. Black D. is produced in India from *canarium strictum*, and white D. or piny varnish exudes from *Vateria Indica*. A kind of D. is also yielded by *Popea micrantha*, a tree very common in the Malay Peninsula, Borneo, Sumatra, &c., and probably some portion of the Singapore D. of commerce is obtained from this source. The D. imported into England makes very clear, hard varnishes.

Dammara, a genus of *Coniferæ*, found in the islands of the Malay Archipelago, New Zealand, and New Guinea. *D. australis*, the Kauri or Cowdie-pine of New Zealand, yields a hard, brittle resin like copal. In commerce it is known as Australian copal, Kauri gum, and Australian dammar, and is chiefly used for the manufacture of varnishes. *D. orientalis* yields Indian dammar. The timber of *D. australis* is valued for masts and spars. *D. macrophylla*, of the South Sea Queen Charlotte Islands, *D. Moorii*, New Caledonia, *D. obtusa*, of New Hebrides, and *D. orientalis*, are all handsome trees of this genus. The latter, which is an inhabitant of the Moluccas, and grows to the height of 100 feet, yields a kind of fine transparent dammar.

Dammu'dah, a tributary of the Hoogly, rises in the district of Behar, province of Bengal, flows E. and S.E., and joins the Hoogly near its mouth, after a course of nearly 400 miles. Its valley, traversed for nearly 100 miles by the Calcutta and North-Western Railway, is rich in coal and iron.

Damnum, in Roman law, signified any loss sustained in person or property. In Scotch law, *damnum absque injuria* denotes losses for which the sufferer has no legal right of compensation against the person causing his loss. Thus, where a new school is established to the detriment of one previously established, the latter sustains *damnum absque injuria*.

Damnum Fatale, a term of Scotch law denoting inevitable accident. See ACT OF GOD.

Dam'ocles was a companion of Dionysius the Elder, tyrant of Syracuse, who, as Cicero relates, flattered that monarch by extolling his power and felicity. Dionysius placed the sycophant amidst the luxuries of a magnificent banquet, and suspended over his head by a single horsehair a naked sword. When D. observed his danger he formed a truer estimate of royal honours.

Da'mon and **Pyth'ias**, or **Phin'tias**, two Pythagoreans of Syracuse, of whom the latter was condemned to death for plotting against Dionysius I. He obtained permission to leave Syracuse to arrange his affairs, and D. willingly offered himself as a pledge for his friend's return. He returned just in time to prevent the sacrifice of D.'s life for his own, and Dionysius, struck with admiration of their friendly devotion, pardoned P., and requested to be admitted to their friendship.

Dam'per, a movable door in a flue or chimney by which the passage of air through it can be checked to any required extent. *Dampers* in a pianoforte are hammers which rest upon the strings, and thus prevent their sounding except so long as the corresponding keys are held down. A pedal is always provided, which, when pressed, lifts the whole of these dampers off the strings at once.

Dam'pier Archipelago and **Strait** are named after the celebrated navigator.—The *archipelago* consists of about twenty small rocky islands, situated close to the N.W. coast of Australia, in S. lat. 20°-21° and E. long. 116°-118°.—The *strait*, which is 35 miles broad, divides the islands of Waigiou and New Guinea, and is situated in E. long. 131°, a few miles S. of the equator.

Dampier, William, navigator, buccaneer, and author, born of a good family in the parish of East Coker, Somersetshire, in 1652, joined a vessel at Weymouth as a boy, and sailed successively to Bayonne, Newfoundland, and in 1673 to the East Indies. He afterwards joined the naval service, and fought in two battles against the Dutch. He is next heard of as overseer of a plantation in Jamaica; but after six months' experience of this peaceable employment, he embarked in 1675 at Kingston for Campeachy Bay, where he was engaged in logwood-cutting till 1678, when he returned to London. Sailing again in 1679 for Campeachy, he joined a company of filibusters, and in 1680 he was one of a number of 360 buccaneers, who, having crossed the Isthmus of Panama, burnt the fort and town of Santa Maria, seized a number of canoes on the coast, and in these attacked and captured eight Spanish ships which were lying at anchor about two leagues from Panama. D. afterwards scoured the Gulf of Mexico, and during 1683-88 was actively engaged in buccaneering off the coasts of Africa, America, the Philippines and China, the Moluccas, and New Holland. Disgusted with the cruel and violent practices of his companions, he resolved to separate from them. Accordingly, in May 1688, when near the Nicobar Islands, he and seven others, abandoning the vessel, sailed off in a small boat, hoping to reach Atchin. Of the eight adventurers, only D. and another reached the coast of Sumatra alive. Setting out again in search of fortune, D. arrived in England, 16th September 1691, and published his *Voyage Round the World*, which attracted immediate attention. The

Government commissioned him to undertake a voyage of discovery in the regions which he had already explored, and D. sailed from the Downs, 6th January 1699. He explored the N. coasts of New Guinea, cleared the passage now known as D. Straits, and discovered many islands W. of New Guinea. On his return home he was wrecked. D. was never afterwards intrusted with full command, though he made at least two other voyages, the one in 1704, the other in 1708–11, as pilot. After the latter date, D. is no more heard of, and the year of his death is unknown. He is the author of *A New Voyage Round the World* (Lond. 1698), an *Account of the Philippines*, and an *Account of New Holland*. His works have considerable descriptive power and a fresh, nautical flavour, and show a clear, shrewd, and observant mind. See Pinkerton's *Collection of Voyages and Travels*, and Burney's *History of the Buccaneers of America* (Lond. 1816).

Damping off, a term used by horticulturists to express the death of plants, such as young seedlings, by an excess of moisture in the soil and atmosphere, especially in stoves and hotbeds.

Dam'sons. See PLUM.

Damugg'o, a large town on the Niger, Upper Guinea, composed of circular mud-built huts supported by ribs of wood. Considerable trade is carried on, and yams and Indian-corn are the chief agricultural products. Pop. uncertain.

Dan. See DON.

Dan (Heb. 'judgment') was the fifth son of the patriarch Jacob. The tribe was the most numerous of all (62,700, Num. i., 64,400, Num. xxvi.) except Judah, although the territory it received in the land of Canaan was the smallest. It was, however, the most fertile part of the country, and tempted the Canaanite neighbours to seek to possess it, during which contest Samson appears on the scene. Perhaps on this account the tribe migrated to the N. and took possession of the town of Laish, which, under the name of D., was afterwards the northern extremity of the country.

Dan'a, Richard Henry, an American poet, born at Cambridge, Massachusetts, November 15, 1787, and educated at Harvard University. He entered the legal profession, but soon adopted literature. In 1818 he became editor of the *North American Review*, and published the *Idle Man* in 1821. His early poems, *The Dying Raven* (1825), the *Buccaneer and other Poems* (1827), and his *Poems and Prose Writings* (2 vols. 1850), have won for him a considerable reputation as a poet and essayist.—**Richard Henry D.**, son of the preceding, lawyer and author, was born at Cambridge, Massachusetts, August 1, 1815, and educated at Harvard. He made a voyage to the Pacific as a common sailor, and gave his experience in *Two Years before the Mast*, his most popular work. D. was admitted to the bar in 1840, published *The Seaman's Friend* (1841), and contested Essex, Massachusetts, against General Butler, in 1867, for a seat in Congress, but was defeated. He edited Wheaton's *International Law* (1866). President Grant nominated him (1876) United States Minister to England, but the Senate rejected the nomination by a vote (April 5) of thirty-six against seventeen.—**James Dwight D., LL.D.**, an American geologist and mineralogist of European reputation, born at Utica, New York, February 12, 1813. He graduated at Yale College in 1833, published his *Mineralogy* in 1837, accompanied Wilkes' exploring expedition in the Pacific Ocean (1838–42), and was busy for several years after in giving the scientific world the results. D. is author of a *Report on Zoophytes* (Wash. 1846), *Geology of the Pacific* (Wash. 1846), *Crustacea* (Wash. 1852), *Coral Reefs* (Philad. 1853), and *Manual of Geology* (1862). In 1855 he was appointed Professor of Natural History and Geology in Yale College, and is a lucid and eloquent expounder of science.

Dan'aë, daughter of Acrisius, King of Argos, was confined by her father in a brazen tower to prevent the fulfilment of an oracle that a son to whom she would give birth would cause his death. But Jupiter wooed the maiden in a golden shower, and she became the mother of Perseus, whereupon Acrisius shut the mother and her child in a chest, and exposed them on the sea. Their floating prison drifted to Seriphos, where it was found by Dictys, a fisherman, who conveyed its tenants to his brother, King Polydectes. According to the common legend, Polydectes became enamoured of D., but dreading Perseus, now grown up, he sent him to subdue the Gorgons, and secure for him the head of Medusa, which he alleged he would present to Hippodamia as a wedding-gift. Perseus returned with the trophy, retired with his mother to Argos, and inadvertently slew Acrisius, thereby fulfilling the oracle.

Dan'aüs, son of Belus and Anchinoë, was originally King of Libya, while his brother, Ægyptus, ruled over Arabia. The brothers having quarrelled, D. fled in the ship *Armais* with his fifty daughters, and eventually reached Argos, of which he was chosen king. The fifty sons of Ægyptus came to Argos and asked their cousins in marriage. To this D. consented, at the same time providing each of the brides with a dagger, and enjoining them to slay their husbands on the night of the nuptials. This they all did except Hypermnestra, who spared Lynceus. D. persecuted him for a time, but became reconciled to him, and appointed him his successor. As a punishment for their crime, the Danaïdes were compelled in Hades to fill continually a vessel full of holes. From D. the Argives were called Danai.

Dan'avirke, a long wall in Slesvig, about 8 miles long, from 24 to 40 feet high, ascending from the Slei to the river Trene. Tradition says it was built in the 10th c. by King Gorm and his wife Thyra. It was restored and strengthened in 1850, but was captured by the Austro-Prussian troops in the Danish war of 1865.

Dan'by, Francis, a historical and landscape painter, born near Wexford, November 16, 1790, and educated at the Royal Dublin Society. In 1820 he removed to Bristol, and, after residing for several years in Switzerland, settled at Exmouth. He died in 1861. Most of his works are illustrative of Scripture or profane history, such as 'The Deluge,' 'The Passage of the Red Sea,' 'Marius among the Ruins of Carthage.' His son, James D. (died 1875), was also an artist.

Dance of Death (Lat. *Chorea Machabæorum*, Ger. *Todten Tanz*, Fr. *La danse Macabre*), an allegory which took its origin in the 14th c., symbolising the sway of death over all men under the image of the dance. Visual representations of death were first made common after the spread of Christianity, and the skeleton became the most popular effigy. Monkish asceticism favoured the gloomy symbol: it was in harmony with the days of penance and flagellation. But a reaction followed the religious terrorism. Mediæval grotesquerie played with the notion and the personification of death, made the skeleton the medium of burlesque and mockery, and finally was wont to depict it in the action and posture of dancing. The allegory is presented in two forms—the dramatic and the pictorial. The drama first appeared in Germany, and was a sort of religious pantomime, being acted in the churches. Death, the centre figure, surrounded by persons of all stations, engaged in a dance, during which the characters vanished one by one, to indicate that they had died. Later, in France, this crude idea was elaborated into the *Danse Macabre*, a set of brief dialogues between Death and his companions, who were generally twenty-four in number. The title is perhaps taken from the Maccabees, the drama being performed on the festival of the seven martyred brothers, whose story is told in the seventh chapter of that book. Early in the 15th c. the drama reached Spain, under the title *Dança General de los Muertos*. The pictorial aspect of the allegory succeeded the dramatic. It arose in France, but took deepest root in Germany. England also has specimens of the pictured D. of D., received from Paris. The subject became common in painting, sculpture, and tapestry-work—the skeleton leading to the tomb a crowd of personages dressed in the fashion of the day, and typical of all classes. Very ancient specimens exist at Lübeck, in Auvergne, and at Basel. The last is said to have been painted in commemoration of the ravages of a plague. In the 15th c., when the drama was lost sight of, the pictured D. of D. assumed new forms, and entered largely into popular art. The subject was frequently used in the decoration of public buildings, as in the series of bas-reliefs on the façade of the Castle of Dresden, and the paintings in the cloister of Old St Paul's, London. The antique idea culminated in the fifty-three designs, called *Imagines Mortis* of Holbein, the German painter. See Peignot's *Recherches sur les Danses des Morts* (Par. 1826); Douce's *Dissertation*, prefixed to Holbein's *D. of D.*; Douce's *D. of D.* (Lond. 1833); and Russell Smith's edition of Holbein's *D. of D.*, with introduction and notes (1849).

Dancette', or **Danse**, in heraldry, one of the two zigzag dividing or border lines, having an indentation larger than the other, which is called the *indented* line. In early blazonry a *fesse D.*, and sometimes a series of *fusils*, or elongated lozenges, conjoined *per fesse*, is styled simply a D.

Dan'cing may be defined as a rhythmical movement of the limbs. Among all people and in every age it has found favour with youth, and in most of the ancient nations it was an essential feature of religious worship. Moses and Miriam danced when the Israelites passed through the Red Sea. 'Praise him,' says David (Ps. l.), 'with the timbrel and dance;' and the same monarch, we are told, danced before the ark. Among the Greeks the significance of D. had a very wide range. The dance of the Eumenides or Furies typified the vengeance of heaven on the sins of earth; while certain hymns and dances in the market-places were expressive of the gratitude of man to heaven. The famous Pyrrhic dance represented the overtaking of an enemy and doing battle with him. Dances of a solemn, mystical nature were introduced into the representations of the Greek tragedies. The Romans, again, seem to have regarded D. as an effeminate amusement. In 1650 D. was prohibited in Scotland by an Act of the General Assembly. In our own time it is by many not only regarded as effeminate but as immoral. While the latter view may be regarded as a relic of that puritanical spirit which Scott has so skilfully drawn in his character of David Deans—whose righteous wrath at the notion of his daughters dancing will be remembered—it must be admitted that public D. is not always secure from the accusation. To private D. the only objection is one of hygiene. To spend the hours usually given to sleep in crowded, overheated rooms must be hurtful to health, and therefore to beauty.

Dancing and Music Licence.—By 25 Geo. II. cap. 36, the keeping within the cities of London and Westminster, or within twenty miles round, without licence from the Quarter Sessions, any house, garden, or place for public dancing, music, or other public entertainment, is prohibited under a penalty of £100 on the keeper. The house is to be held disorderly, and, as such, to be dealt with according to law.

Dancing Mania, an epidemic of frequent recurrence in the middle ages, and most common in the large German towns. It was a wild hysteric excitement, finding vent in convulsive gestures and delirious motion. Many only feigned to be so affected; but the disorder was to a great extent real, its victims losing all power of will, and sometimes in their madness committing suicide. The most extraordinary outburst of this mania occurred towards the end of the 14th c. It began in the city of Aix-la-Chapelle among those assembled for the Feast of St John. Religious excitement rose to the extremes of frenzy; men and women, uttering maniacal cries, danced through the streets. The epidemic spread over all Holland and part of Germany to Strasbourg and Cologne. Crowds of maniacs, their ranks joined by many pretenders, went dancing through the country, and much riot and profligacy ensued. In Italy, where it was frequent in the 15th c., D. M. was known as *Tarantism*, being attributed to the bite of the Tarantula spider. The malady became known as St Vitus's Dance, and was cured by immersion in cold water, according to the remedy of Paracelsus. It died out in the 17th c., and is now met with only in isolated cases. See Hecker's *Epidemics of the Middle Ages.*

Dandeli'on (*Taraxacum dens leonis*, *T. officinale*, or *Leontodon Taraxicum*), a plant of the natural order *Compositæ*, common in pastures and by waysides all over Europe, and now naturalised in America and most other temperate parts of the world. The popular name is a corruption of *Dents du lion*—lion's teeth—and refers to the incisions on the margins of the 'runcinate' leaves. The root-stock is used as a tonic and aperient in liver complaints, and as a diuretic. The leaves, though disagreeably bitter, when blanched are sometimes used as a salad, and the rhizomes are used in the same way as chicory for mixing with coffee. The whole plant is permeated by milky juice, and contains resin, inuline, sugar, and a crystalline principle called *taraxacin*. It is eagerly eaten by rabbits and other wild animals, and in default of mulberry leaves is used to feed silk-worms.

Dan'dolo, an illustrious Venetian house, from which four Doges were chosen. The most distinguished of these was **Enrico D.**, elected in 1192. He governed with wisdom and energy, and persuaded the Venetians to furnish ships to the warriors of the fourth crusade in 1201. As the sum stipulated for the fleet was not paid by the crusaders, D. induced them to assault Zara, a town of Dalmatia in rebellion against Venice. After its capture, the crusaders and Venetians proceeded to Constantinople, which they assailed under pretence of dethroning a usurper. D., who was blind and above ninety years of age, led the attack by sea, and was the first to leap ashore. The city was taken, and the deposed Isaac and his son Alexius were restored to power, but an insurrection arising, were summarily executed, and the Byzantine Empire divided among the Latins and Venetians. D. was offered, but declined, the crown, accepting instead the title of Despot of Rumania. This conquest added considerably to the Venetian dominions. He died at Constantinople, 14th June 1205. See Andrea D.'s *Chronicle* in Muratori.

Dan'ebrog, or **Dannebrog, Order of** (Old Dan. 'banner of the Danes'), the second or red-cross order of knighthood in Denmark, is said to have been founded by King Waldemar II. in 1219. The order was revived in 1693, was reconstituted in 1808, and is conferred for eminent civil or military services on persons of all ranks and ages. The decoration is a gold cross patée, enamelled with white, and suspended by a white ribbon embroidered with red.

Dane'geld, or **Danegelt** (Old Eng. 'Danish payment'), a tribute paid by the English to the Danes to stop their ravages. It was first raised by Æthelred II. in 991, and again in 1003, and levied after expulsion of the Danes to pay fleets for the protection of the coasts. The tax was suppressed by Eadward the Confessor in 1051, but revived by William the Conqueror, and abolished by Stephen. Every *hide* of land—that was as much as one plough could plough, or, as Bede says, as much as could maintain a family—was taxed, at first at 1s., afterwards at 7s.

Dane'lagh, properly **Denala'gu** ('Danish law'), the name given to the district in England which Ælfred ceded to the Danes under Guthrum by the treaty of Wedmore, 878 A.D. It was called D. because it was governed by Danish law. It included the greater part of England, comprising Northumbria, East Anglia, most of Essex, and most of East Anglia, or all eastern and most of central England, from the Thames to the Firth of Forth. Eadward the Elder won back Mercia, Essex, and East Anglia, but in the reign of Eadmund (940-946) Watling Street was again made the boundary between the D. and Wessex. The name D. was disused after the Norman conquest.

Danemo'ra, a town in the province of Gothland, Sweden, 22 miles N. of Upsala, famous for its extensive iron-mines. There are seventy nine shafts in the neighbourhood, of which seventeen are worked. The iron is of the best quality, and large quantities of it are exported to England. Pop. (1874) 1089.

Dan'iel (Heb. 'God is my judge'), **The Book of**, consists of two parts: chs. i.-vi. contain the history of D. and three other youths who had been carried away to Babylon on the capture of Jerusalem by Nebuchadnezzar; chs. vii.-xii. contain the account of four visions which occurred to D., written down by himself. The general voice of tradition has been that the first part of the book is authentic history, and that the D. mentioned was the author of the whole. Modern criticism, however, maintains that the book was composed as late as about the time of Antiochus Epiphanes (175-164 B.C.), *i.e.*, three and a half centuries later than the time specified in the book, the historical narrative of D. being a disguised but unmistakable representation of the circumstances of the Jews under Antiochus, as described in the books of the Maccabees (*cf.* D. iii. with 1 Macc. i. and 2 Macc. vi. vii.; also D. iv. and v. with 1 Macc. i. 21 ff., and 2 Macc. v. 15 ff.). According to this view, the names of the four youths —D., Mishael, Hananiah, and Azariah—were found among the exiles who returned from Babylon (Neh. viii. 4, x. 2, 6, 23). See Bleek's *Introduction to the Old Testament.*

Dan'iel, Samuel, an English poet, was born in 1562 near Taunton, Somersetshire. He studied at Oxford, was tutor to Lady Anne Clifford, afterwards Countess of Pembroke, and held an office at the court of James VI. He resided generally in the country, and died at Beckington farm, in Somersetshire, October 14, 1619. His chief work is the *History of the Civil Wars between York and Lancaster.* It is prolix and languid, with much

pensive meditation and occasional bursts of eloquence. The verse is sweet and limpid, and the diction carefully sifted. D.'s style, says Professor Lowell, is as modern as Tennyson's. Among D.'s other works are *The Complaint of Rosamund*, *Tragedy of Cleopatra*, *The Queen's Arcadia*, *Musophilus*, and *Sonnets*. In prose, he wrote a *History of England* and a *Defence of Rhyme*, which Swinburne calls 'one of the most perfect examples of sound sense, of pure style, and just judgment in the literature of criticism.' D.'s poetical works were published at London in 2 vols. (1718).

Daniell, John Frederick, D.C.L., F.R.S., a distinguished chemist, was born in London, March 12, 1790, became Professor of Chemistry at King's College, and died March 14, 1845. He is widely known as the inventor of the galvanic cell and hygrometer which bear his name, and he is the only person that ever obtained the three Royal Society medals. His chief work is *Meteorological Essays* (1823), besides which he wrote an *Essay on Artificial Climate* (1824), an *Introduction to Chemical Philosophy* (1839), and several valuable papers read before the Royal Society.

Dan'ish Language and Literature. The D. L., an offshoot of the Scandinavian branch of the Teutonic family of speech, though spoken only by the Danish people, has been for 400 years past the written language of Norwegians also. Runic inscriptions, &c., prove that in the 10th c. one language, called the 'Danish tongue' (*donsk tunga*), prevailed in the three Scandinavian kingdoms, Iceland, the Faröe, Orkney, and Shetland Isles, and some parts of England and Scotland. This separated in the 11th c. into two main divisions: a Norwegian-Icelandic and a Dano-Swedish, the latter distinguished by its rejection of the *h* sound before *l*, *r*, and *n*, and the substitution of single long vowels for the old diphthongs. The Danish side of this Dano-Swedish already in the 13th c. showed three dialects: (1) 'Skaansk' (Scanian), which most resembled the old language; (2) 'Sjœllandsk' (that of Zealand); and (3) 'Jydsk' (of Jutland), which differed most from the old, owing to its weakening or changing many vowel-sounds and word-forms. In the two last, inflectional endings fall off, final vowels are lost, *a*, *i*, and *u* are gradually reduced to a less distinct *a* or *æ*, while the hard mutes *p*, *k*, and *t* still remain after vowels in the 13th c., as is on the whole yet the case in Norwegian and Swedish. At this time the vocabulary was entirely of native origin, except some Greek and Latin words introduced along with Christianity; but in the 13th and 14th centuries the language reached what is essentially its present form. Based on the dialect of Sjœlland, it preserves the character of a distinct and homogeneous speech, whose chief characteristics are that *t* or (in pronouns) *d* is substituted for the soft *th*, and the softer *b*, *g*, *d* for the hard *p*, *k*, *t*, and that the inflections are reduced to a few forms, substantives presenting only the possessive in *s*, and merging masculine and feminine in common gender. Verbs lose person, and generally (except in the imperative) number also, as the singular was already beginning to supplant the plural. The vocabulary of prose writers in this period received considerable additions from Low German, especially nouns in *-hed*, and verbs with the prefixes *be-*, *for-*, *und-*, and sometimes *er-* and *an-*. But these, unusual in the poetry, were even more rare in the spoken language of the 14th and 15th centuries. The influence of High German began chiefly in the 16th c., and appears in various words formed anew after the German fashion, which yet bear but a small proportion to the portion of the D. L. that has sprung from purely Scandinavian sources.

Literature.—Before the Reformation the softer and weaker dialect of the Old Norse, spoken by the people of Denmark, was not to any extent a written language, for the clergy, then almost the only educated class, naturally preferred Latin to the yet unformed mother-tongue. Of these, Saxo-Grammaticus (q. v.) wrote in the end of the 12th c. a valuable history of Denmark. The writings intended for the laity were in Danish, and consisted of (1) laws, and (2) uninteresting chronicles, partly in prose and partly versified. But, on the whole, the literature of Denmark in the middle ages is only of antiquarian interest, except some works of genius called *Kæmpeviser* ('Hero Songs'), which, though unwritten, passed in song from generation to generation, and are easily recognisable as true and beautiful popular poetry.

At the close of the 15th c. a university was founded and printing introduced into the country, but for a time little activity was shown, except in the printing of the laws, class-manuals, and Catholic service-books that had been used in the middle ages. The intellectual movement, however, that preceded and accompanied the Reformation, issued in a far more widespread literary interest, and in the publication of Danish translations of Scripture and devotional books, as well as numerous theological and polemical writings. The language, being incessantly employed, became more plastic, though, at the same time, it was greatly impregnated with Germanic ingredients. Christiern Pedersen displayed a correctness and ease in style hitherto unknown; and, indeed, the influence of the great religious movement may easily be seen in the steady progress of literature till 1660. It resulted in learned Latin and popular Danish books (chiefly in theology, still the favourite science), which, though subjected to a strict censorship, and becoming less fresh after the Reformation period, yet showed much talent and acuteness. The greatest names are those of Hemmingsen in the 16th and Brochmand in the 17th c. Theology was not now confined to the clergy, but was cultivated by many of the nobles, and especially by Rosencrantz. Physical science had the celebrated Tyge Brahe, whose observations and discoveries excited the admiration of Europe; medicine, the two Bartholins and Ole Worm, also famous as a naturalist. Science could not be successfully cultivated without fluency in Latin composition, which was, accordingly, written by many with ease in both prose and verse. At the same time the native language was not neglected. Saxo's book was translated into good Danish by Bedel, who also published an edition of the old *Kæmpeviser;* Claussön's translation of Snorre Sturlason's *Heimskringla* ('Sagas of the Kings from Odin to Sverre') was eagerly read by many, and the beginning of the 17th c. was marked by an increased interest in Danish antiquities and the old Icelandic literature. The poetry of this whole period was of less value than its prose, for the hymns of the Reformation were more pious than poetical; but towards its close there appeared a highly gifted poet, Arrebo. Still his genius could neither wholly supply the deficiencies of his native language, nor make up for the want of taste in an age whose poetic nourishment was the romances and stories that are now the amusing reading of the lower orders.

From the Peace of Roeskilde in 1660, which gave to Sweden the Danish provinces on the other side of the Sound, the literature becomes somewhat poorer. The old nobility that had favoured learning now lost their influence, and the court showed little interest in it. Science, however, was still cultivated, and versifiers abounded, but there were two who rose above the rest, and wrote in better Danish and with purer art—Bording and Kingo.

It was Holberg who, in the first half of the 18th c., created a new era in literature and popular thought. The wide range of his productive activity, his uniform excellence in all departments of literature, his wit and humour, his liberal-mindedness and natural point of view, were in themselves an education to the people. In the separate fields of poetry, however, Reenberg, Falster, and Helt were his successful rivals; and to this period belong also the original, though unequal, *Heltesanger* ('Songs in Praise of Heroes') of Sorterup, the lyrics of Stub, and the hymns of Brorson.

With the accession of Frederik V. in 1746 begins a higher development in literature and language, due partly to Latin being more restricted to learned works, and partly to the study of foreign models. In the Academy of Sorö, restored in 1747, Sneedorff edited the weekly *Patriotisk Tilskuer* ('Patriotic Spectator') Kraft wrote philosophy; Schytte, political works; and Schöning, a learned history of Norway. Encouraged by the patronage of many public and private societies, and the steady liberality of the Government, every department of knowledge was now cultivated, but no one can be said to have made an epoch in any particular science. Pontopiddan (q. v.) was of less note in theology than in history, which was also written by Suhm, Guldberg, Kofod Ancher, the younger Sneedorff, Riegels, Malling, and Wandal. Rothe was an eminent expositor of Christian philosophy, and was ably supported by Bastholm in the struggle of the Church against free-thinking. Many of the poets in this period were also successful prose writers, as are Brun, Abrahamson, Pram, and the versatile and lively Rahbek. Others confined themselves to poetry. Of these, the most notable are Tullin, whose *Maidag* ('Mayday') and longer didactic poems are full of natural descrip-

tion in noble language; Ewald, gifted with a high imagination and manifold harmony; Wessel, whose *Kjærlighed uden Strömper* ('Love without Stockings') is a masterpiece of pure comedy; and, omitting a long list of minor poets, Baggesen, who, whether serious or gay, was invariably successful in expressing original thought in beautiful verse.

The 19th c. inherited from the 18th great enlightenment, facility, and culture, but also a monotonous elegance of style, mock-sentiment, superficial science, and recklessness in religious and political thought. In Denmark, the last decade in particular was marked with these blemishes, but about the opening of the century there appeared a tendency towards a truer perception of nature and human life, due partly to the fresh philosophy and poetry of Germany, and partly to the influence of the French Revolution. This had already effected much in the first fourteen years of the century, which are more striking for a widely diffused scientific spirit than for any large number of learned men. Munter was the most erudite writer of the period, and did much for Church history; and Muller's *Systematic Theology* had considerable merit. Two great religious authors of different views, Mynster and Grundtvig (q. v.), already gave earnest of their future influence. The new philosophical ideas of Steffens (q. v.) created great interest, and a philosophical spirit showed itself also among scientific men. The two Oersteds were famous, the one as a jurist and the other as a physicist; but history, especially that of Denmark, was the favourite study, and was cultivated by Werlauff, Simonsen, Baden, Nyerup, and Molbech. Grundtvig interpreted Scandinavian mythology, and Rask (q. v.) published his introduction to the Old Icelandic. Poetry blossomed with equal luxuriance. Oehlenschläger (q. v.), the father of 19th c. art in the national literature, founded the Romantic school of Danish poetry, giving it a wholly Scandinavian colouring. Grundtvig and Staffeldt were the other two poets of the period; but the latter cared little to please the multitude.

From 1380 to 1814 Norway was politically united to Denmark, and an independent, though often scarcely distinguishable, Northern element was merged in Danish literature; but since their separation, Norwegian literature has successfully claimed independence. Since 1814 Denmark has seen the complete development of the views of Grundtvig, while other theological schools have been well represented. Especially noteworthy are the remarkable Christian philosopher Martensen, the sarcastic but deeply earnest S. Kjerkegaard, the acute and orthodox Rudelbach, and the clear rationalist Clausen. Kolderup-Rosenvinge, Larsen, and Scheel wrote ably on law; Kayser and David on political economy. Grundtvig, P. E. Muller, and the learned Finn Magnusen (q. v.) have been of great service to early Danish history and mythology, as also Rafn (q. v.), Petersen, Thomsen, and Worsaae (q. v.). Mediæval and modern history were further treated by the writers belonging to the earlier part of the century, as well as by many younger men, of whom Wegener, Schiern, and Estrup merit notice. In philology, the Danish lexicographer Molbech, the Orientalist Westergaard, and the great Latin scholar Madvig (q. v.) are famous. Philosophy has been cultivated by Sibbern, Nielsen, and Brochner, and the natural sciences have had numerous students. Among the poets of this period we still find Oehlenschlager, Grundtvig, and Baggesen (q. v.). Ingemann has had great power as a lyrist, dramatic poet, and novelist, and Heiberg's fine taste and keen insight are evident in his poems, but especially in his dramatic works. The latter was the father of the Danish *vaudeville*, but his *Elverhöi* ('The Hilltop of the Elves') displays quite different talent. Blicher's sketches of common Jutland life, and Fru Gyllenbourg's and 'Carl Bernhard's' tales have had great popularity. Winther, especially admired as a lyrist since the *Gjenganger-brevene* ('Ghost Letters'), has been conspicuous in all fields of poetry. Andersen (q. v.) is naturalised in every part of the civilised world. Paludan-Müller's *Adam Homo* is a striking and original work. We may also mention the comic dramatist Bögh, and among recent novelists H. F. Ewald, Goldschmidt, and the still greater Bergsöe. See Kraft and Nyerup, *Almindeligt Literaturlexicon* (3 vols. Copenh. 1777–84); Erslev, *Almindeligt Forfatter-Lexicon* (4 vols. 1842–56); Rahbek, *Bidrag til den danske Digterkonsts Historie* (1800); Fürst, *Briefe über die dän Literatur* (2 vols. 1816); Höst, *Danske Bibliographie* (1843–53); Petersen, *Beiträge zur Dän. Literatur* (5 vols. 1853–61).

Dankali′, or **Danakil**, an independent Abyssinian state, extending along the coast of the Red Sea from the Peninsula of Buri to the Gulf of Zajurra. The land is barren, and the inhabitants consist of about 70,000 nomads and fishers. They are indolent, cruel, and fanatically devoted to Islamism.

Dann′ecker, Johann Heinrich von, a celebrated German sculptor, was born near Stuttgart, October 15, 1758. His father was a groom in the service of the Duke of Würtemberg, who became his patron, and gave him an education. D. had early success in his art; he went to Paris in 1783, and to Rome two years after. At that city he remained till 1790, when he returned to Germany, and was appointed Professor of Sculpture in the Academy at Stuttgart. There he resided till his death, December 8, 1841. Heathen mythology supplied D. with his earlier subjects, among which are the 'Dryad' and 'Love and Psyche.' Of his later works, chiefly Christian, the principal is his colossal 'Christ,' which the sculptor was eight years in completing. His portrait-busts are also admirable. No one could make stone express the physical lineaments of character better than he. His 'Schiller,' 'Lavater,' 'Gluck,' &c., won him a great popularity. See Grüneisen and Wagner's *D.'s Werke in einer Auswahl, mit einem Lebensabriss des Meisters* (Hamb. 1841).

Dan′te (contracted from **Durante**), **Alighie′ri**, born at Florence, 8th May 1265, was the son of a Guelph lawyer, who was banished from Florence during the government of Novello, the *podesta* of the Ghibelline Manfred of Hohenstaufen. D. was educated by his mother, Donna Bella, and Brunetto Latini, Secretary of the Florentine Republic, and subsequently at Bologna, the '*Mater Studiorum*,' and the great Law College of Padua. In 1290 Beatrice di Portarini, whom D. had tenderly loved, but who had married into the Bareli family, died. D. then produced his *Vita Nuova*, which, with his other canzonets (he was intimate with three eminent troubadours), procured for him the name of 'the poet.' D. served in the wars against Arezzo and Pisa. After an unhappy marriage, in 1291, with Gemma, daughter of Manesso Donati, which resulted in a separation, he rose to office in the Supreme Council of *Priori* (six in number), when the civil wars between the Bianchi and Neri broke out. Charles of Valois, called in as mediator in 1302, sentenced D. to exile and an oppressive fine. Shortly after, a revolutionary tribunal sentenced him to be burned alive along with the other Bianchi, who wished to resist the extreme pretensions of the Pope. In 1309 he wrote his treatise *De Monarchia*. After wandering from one city to another, and joining in one or two forcible attempts to re-enter Florence, D. died at Ravenna, 14th September 1321. At his death he belonged to the party of the *Verdi*, or *Democratic* Ghibellines, as distinguished from the *Secchi*, or pure Imperialists. Doubts exist as to the part actually taken by D. in public affairs at Florence, and in diplomatic missions at Rome and Paris. To the year 1305 belong *Il Convito*, in which Beatrice appears as Philosophy, and a treatise on the Italian language, *De Vulgari Eloquentia*. The *Divina Commedia* was begun in 1300, but not completed for many years. Hence events subsequent to 1300 are prophesied. Sismondi asserts that D., who was ignorant of the drama, used the word 'comedy' merely because he thought Virgil alone entitled to the word 'epic.' The poem is divided into the *Inferno*, the *Purgatorio*, and the *Paradiso*. Virgil and St Bernard conduct D. through these divisions of the invisible world, with the view of enabling him to write a poem which shall show to Italy the true source of its misery. The extremely allegorical nature of the whole may be seen in the first canto of the *Inferno*, where a panther represents Florence, or Envy; a lion, France, or Ambition; a she-wolf, the court of Rome, or Avarice; a greyhound, our Saviour or his vicegerent, the Emperor of the Romans; Virgil, Human Wisdom; and Beatrice, Heavenly Wisdom. Hell is represented (quite differently from Milton's conception, and from the early Christian conception, which placed it in the centre of the earth) as an inverted cone from the surface to the centre of the earth, with a dark valley at the mouth called Limbo, and nine circles appropriated to different degrees of crime. Like Michael Angelo, D. uses the traditions of classical mythology to furnish these regions. He is a good Catholic, and represents the wise and good of antiquity as lying in tears and groans, caused, not by actual torture, but by the irrevocable want of baptism. Purgatory is a steep mountain in the hemisphere opposite to

hell: seven rounds have to be climbed through before the seven stains of sin are washed away; the sea washes its base; at its top is the garden of Eden. Here D. meets a number of his friends (some who had been excommunicated by the corrupt Church), with whom he discusses various questions, political, social, and metaphysical. He seems to look forward to some apocalyptic judgment on the temporal power of the Pope as a cure for the ills of Italy. From Eden D. ascends with Beatrice to Paradise through the various heavens of the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn. The eighth heaven contains the triumph of Christ, and the Virgin and Adam also dwell there. In the ninth, or empyrean, is a manifestation of the divine essence, veiled by three hierarchies of angels. This wonderful poem is written in the *terza rima*, in which three verses are so arranged that the middle line of each couplet rhymes with the first and the third verses of the succeeding. The verses are all endecasyllabic, generally consisting of five *iambi*, followed by a short syllable. The *Divina Commedia* speedily became a national book in Italy. The Prince of Milan in 1350 caused a public commentary to be written, and two professorships were founded to promote the study of it. Among his chief commentators are Landino, Bargigi, Bianchi, and Cotterill. Four editions of the work (those of Foligno, Jesi, and Mantora, each of date 1472, and an undated one of Naples) in the British Museum formed the basis of a magnificent reprint, published under the care of Lord Vernon and Sir A. Panizzi. The original readings of another Naples edition (1477) are given in *Sei Cento Lezioni della Divina Commedia*, &c, by Dr Enrico C. Barlow (Williams and Norgate, 1875). The best-known translations into English are those of Cary (1814), Wright (1833), Pollock (1854), and Longfellow (Lond. 1867). One may also note an excellent prose translation of the *Inferno* by Dr John Carlyle (1849). The *Vita Nuova* has been admirably translated by D. G. Rossetti in his *Early Italian Poets from Ciullo d'Alcamo to D.* (Lond. 1861). The *De Monarchia* (Eng. trans by Church, 1878), written to prove that universal dominion should belong to the head of the Holy Roman Empire, is a valuable source of information regarding the Guelph and Ghibelline controversy. See Boccaccio's *Vita di D.*; Rinuncini's *Vita di D.*; Artaud de Montor's *Hist. de D.* (1841); Delecluze's *D. et la Poésie Amoureuse* (1851); Balbo's *Life and Times of D.*, translated by F. Banbury (1852), and Dean Church's *D., an Essay* (1878).

Dan'ton, Georges-Jacques, was born 28th October 1759 at Arcis-sur-Aube. The Revolution found him a briefless advocate. He joined Marat and Desmoulins in the Cordelier Club, and enjoyed the confidence of Mirabeau. His eloquence made him a power; 'his rhetorical tropes are all gigantic, energy flashes from his black brow, menaces in his athletic figure, rolls in the sound of his voice, reverberating from the domes.' He had the courage to defy the arrest issued by Le Chatelet, to denounce the ministers, and call for the deposition of the King. In 1792 D. became Deputy-Procureur of the Revolutionary Commune, incited the Marseillese to attack the Swiss Guard of the Tuileries, an event which made him Minister of Justice, in which capacity this 'Mirabeau of the Sans Culottes' and *Enfant Perdu* of the Revolution sanctioned the September Massacres. He observed that 'a revolution could not take place according to geometrical principles!' Entering the National Convention, he undertook various missions to the Netherlands, and did what he could to forward the death of Louis. He constantly urged the levy of fresh troops, and created the Revolutionary Tribunal. In the Committee of Public Safety he definitively sided with Robespierre against the Girondins, whom he wished to save from extremities. He opposed the Feasts of Reason, and passed the law for payment of forty sous per diem to the poorer deputies. After the fall of the Hébertists, Robespierre found it necessary to get rid of D., and accordingly, on the proposition of the Committees of Public Safety and General Security, the Convention sent him, along with the two Desmoulins, Hérault de Séchelle, Fabre d'Eglantine, Delacroix, Westermann, and Philippeaux, before the Revolutionary Tribunal, which condemned them to death for a conspiracy against the national representation and the Republic, and tending to restore the monarchy. D. was guillotined 5th April 1794. The charges of private immorality and public peculation against D. have to some extent been refuted by Robinet in his *Mémoire sur sa Vie Privée* (Par. 1865), and *Procès des Dantoniens*, published in *La Politique Positive*, 1872. The notes of D.'s trial were taken down by the painter Topino-Lebrun, afterwards executed for complicity in the infernal machine.

Dan'ube, a French form of the Lat. *Danubius*, from a Celtic root *dan* or *don*, meaning water, according to Adelung, is 'the upper water' (Ger. *Donau*, Hun. *Duna*). The Greek name Ister, applied by the later Roman poets to the entire river, was given originally only to the lower part. The D. rises in the Black Forest, in Baden, 2665 feet above the sea-level, and is formed by the confluence of the brooks Brege and Bregach at Donaueschingen. Its general direction is from W. to E., its length about 1750 miles, and its basin about 250,000 sq. miles. After the Volga it is the largest river in Europe. It flows at first E. by N. through Wurtemberg and Bavaria, past Ingolstadt and Regensburg, and at Passau enters the Austrian dominions. Passing Linz and Vienna, it reaches Hungary near Presburg, whence to Waitzen it continues to flow E.; then turning S. past Pesth and Buda, it holds on in this direction until joined by the Draye, when it flows S.S.E. to Belgrade, from which point to Orsova it separates Servia from Hungary. A little below Orsova it passes the 'Iron Gate,' where till 1847–49 the water formed a rapid that obstructed navigation, but by blasting the rocks this hindrance was in a great measure removed. During the remainder of its course it forms the boundary between Bulgaria and Rumania, entering the Black Sea by three main branches, of which the Sulina is commercially the most important. Till it reaches Ulm, where it becomes navigable, the D. is hemmed in by abrupt slopes. In its lower course it expands greatly, and in many places on the borders of Bulgaria is studded with islands. Its delta is covered with reeds and trees. No fewer than sixty navigable rivers contribute to swell the volume of its water, which is nearly as great as that of all other streams that empty themselves into the Black Sea. The principal affluents on the right are the Iser, Lech, Drave, Save, and Marava; on the left, the Ens, Theiss, Sereth, and Pruth. The trade of the D. is chiefly in wheat, timber, hides, tallow, and maize.

Danu'bian Principalities. See RUMANIA.

Dan'zig ('the fort of the Danes,' Pol. *Gdansk*), next to St Petersburg the most important haven in the N. of Europe, and the capital of a district of the same name in the province of Prussia, lies on the left bank of the Vistula, 2 miles from its mouth, on D. Bay, and [illegible]6 N.E. of Berlin, with which it is connected by railway. It has many fine buildings, and is intersected by the two streams of the Mottlau, a branch of the Vistula, which has previously received the Radaune—and hence it has been called 'the northern Venice.' D. is a fortress of the first rank, and the chief station of the Prussian navy, having extensive wharves, arsenals, marine depots, &c. It is an entrepot for Poland, Hungary, and parts of Lithuania, as well as for W. Prussia. Its port is Neufahrwasser, on the coast (pop. 3866). The bar at the mouth of the Vistula only allows vessels of some nine feet of draught to approach the city. Between the two arms of the Mottlau lies the Speicher Island, which has stores capable of containing half a million quarters of grain, and which is kept uninhabited as a precaution against fire. The city is divided into the Vorstadt, Speicherinsel, Niederstadt, Langgarten, Altstadt, and Rechtstadt. The older houses, which are richly ornamented with sculpture, are old-fashioned, irregular, and unique, giving to D. an appearance of quaint originality. D. has a large Gothic townhouse, built in the 14th c., and containing a fine collection of paintings. Its Protestant Marien Kirche dates from 1343–1503, and has a clock-tower 338 feet high, 10 smaller towers, 37 beautifully painted windows (1845), and the famous so called D. picture, a 'Last Judgment,' attributed to Jan van Eyck, but more probably the work of Hemling. The other public buildings of D. include an admiralty college, a school of navigation, a library of 45,000 volumes, a fine Gothic exchange, several literary and art societies, and a new theatre. D. has large manufactures of brandy, liqueurs (*Danziger Goldwasser*), sugar, chemicals, cloths, beer, tobacco, &c., and an active trade, chiefly in grain, seeds, spirits, and timber. In 1875 the grain and seed exported amounted to 160,695 tons; the value of the timber to £1,904,625. The number of vessels that entered the port was 1669 of 525,264 tons; cleared, 1645 of 517,555 tons. The chief imports are coffee, rice, and herrings. In 1874 the import of Scotch herrings amounted to 117,659 barrels. D. has railway connection with

Moscow, and *viâ* Warsaw with Odessa on the Black Sea. Pop. (1871) 88,975, of whom 23,428 are Roman Catholics and 2625 Jews. It is mentioned as early as the 6th c., and in 995 was made the capital of Pomerania. Long an object of contention between Danes and Swedes, it was captured by the Teutonic knights in 1310, and was soon after a flourishing member of the Hanse League. From 1454 till 1793 it belonged to Poland; at the latter date it came into the possession of Prussia, and has since remained so, except during the period 1807-14, when it was one of Napoleon's short-lived duchies. The district of D. resembles Holland in its general aspect, and in the occupations and character of the people. Besides D. the chief towns are Thorn and Elbing. Area, 3035 sq. miles; pop. (1871) 525,012.

Daoudnugar', or **Daudnugg'er**, a town in the executive district of Gya, province of Behar, British India, on the Sone, 90 miles E. of Benares, has manufactures of coarse woollen and cotton fabrics. Pop. (1872) 10,058.

Daph'ne, a genus of shrubs or small trees belonging to the natural order *Thymeleaceæ*, the species of which are widely distributed over temperate and tropical Europe, Asia, America, and Australia. The flowers are fragrant, but the berries are poisonous, and the whole of the plants possess an acidity which in some cases even amounts to causticity. The mezereon (*D. Mezereum*) is a common shrub in gardens, and is rarely found wild in this country. The bark has been used in medicine as a sudorific and alterative in scrofulous, venereal, and other diseases. *D. Laureola*, the spurge laurel, also occurs in woods of this country, and is as acrid as the preceding, but is not used in medicine. In Nepal, the tough fibrous inner bark of *D. cannabina* and *D. Edgworthii* (*Edgworthia Gardneri*) is employed in making paper of a very superior quality, which does not suffer from the attacks of insects or from damp, and is tough, and not liable to break when folded. In India and China deeds and records are made of it; as in Madagascar is the bark of *Dais Madagascarensis*, belonging to a closely allied genus. That of *Gnidia daphnoides* and *G. (Lasiosephon) eriocephala*, allied species (the bark of the latter being also used in India to poison fish), is made into ropes.

Among the other species cultivated in this country are *D. pontica*, *D. alpina*, *D. Cneorum* (all hardy), *D. odora*, *D. indica*, and *D. chinensis*, which can only be grown in a greenhouse.

Daphne, a maiden daughter of the river-god Peneus in Thessaly, was associated in numerous traditions with Apollo. When the god, enamoured of her beauty, pursued her, D. was saved by her mother, Ge, opening and receiving her, and on the spot where she disappeared the evergreen laurel-tree sprang up. According to Ovid, D. herself was changed into the laurel-tree.

D., a magnificent grove and sanctuary situated 5 miles S.W. of Antioch, was formed by Seleucus Nicator, who built in the midst of it a celebrated temple to Apollo and Diana, and around it there rose 'a stately and populous village.' The traditions of the mythological D. were interwoven with the place; the tree into which she was changed was pointed out, and one of the springs was named after that on Mount Parnassus. For many ages the grove was the resort of innumerable pilgrims, who, amid its sensuous gratifications, combined the pursuit of pleasure with the rites of religion. By the zeal of the Christians of Antioch its altar and oracle were deserted, and its complete destruction was effected, perhaps by Christian incendiaries, in the reign of Julian. Its correct site is probably at *Beit-el Maa*, as fixed by Pococke and Richter.

Daph'nia. See WATER-FLEA.

Darabgherd', or **Darab'**, an old town in the province of Fars, Persia, 150 miles S.E. of Shiraz. It stands amid orange and lemon groves in a fine plain, and is encircled by some 30,000 date-palms. Numerous ruins evince its former importance. A mild tobacco, celebrated throughout India and Western Asia, grows in the neighbourhood. D. sends lemon-juice and fruits to every port of Persia. Pop. from 15,000 to 20,000.

D'Ar'blay, Madame, whose maiden name was Fanny Burney, was born at Lynn Regis in 1752. She was the second daughter of Dr Charles Burney (q. v.), the musician. Her novel of *Evelina*, published anonymously in 1778, won the young authoress great repute; and this was sustained by *Cecilia*, which appeared in 1782. After holding a post at court for some years, she married a French officer. Her later works are much inferior to the early ones, though they procured her large sums from the publishers. Madame D'A. died at Bath in 1840. Her *Diary and Letters* (1842 and 1846) preserve a picture of contemporary society, as well as of her own life. See Macaulay's *Essay on Madame D'A.*

Dardanelles' (named from the towers that guard the entrance), are the straits joining the Archipelago to the Sea of Marmora. The ancient name was Hellespont (Helle's Sea), from the fable of Helle and her brother Phryxus. The channel is 50 miles long, of an average breadth of two miles, and at one point it is only half a mile broad. The current from the Black Sea flows through it at the rate of a league an hour, and the consequent difficulty to an enemy of approaching Constantinople is greatly increased by strong defences most favourably placed. In 480 B.C., Xerxes crossed the D. by two bridges from Abydos in Asia to Sestos in Europe, and in B.C. 334 it was crossed by Alexander the Great. The feat of swimming across the D. is associated in ancient times with the name of Leander, and in modern times with that of Byron.

Dares, the reputed author of a pseudo-history of the fall of Troy, popular in the middle ages, and even in the 16th c. Chaucer places D., with Homer and others, on the highest pedestal in the house of fame, and refers to D., not to Homer, for the deeds of Troilus. The Greek version of D., at one time attributed to the D., priest of Hephæstus, mentioned in the *Iliad*, is supposed to have been the work of a Sophist, and was extant in the 3d c. B.C., but is now lost. A Latin prose work, *Daretis Phrygii de Excidio Trojis Historia*, has been preserved. This is either a fabrication of the 5th, 6th, or 7th centuries, or perhaps an abridgment from the Latin epic by Joseph of Exeter, who flourished about the 12th c. It was translated into French verse in the 12th c., and was first printed at Cologne in 1470. This work, which is of no value, was said to be a translation, by Cornelius Nepos, from the original Greek. It is generally printed along with Dictys' Cretensis. The best edition is by Diederich (8vo, Bonn, 1837).

Dar Fur (*i.e.*, 'Fur land'), formerly an important native state, now an annexed territory of Egypt, is situated in the E. of the Sudan, and is bounded N. by the Sahara, S. by the Bahr-el-Homr, a tributary of the White Nile, E. by the steppe of Kordofan, and W. by the forests of Waday. Area, some 106,000 sq. miles; pop. variously estimated from 500,000 to 5,000,000. It is in general an oasis-land, and is traversed from N. to S. by the rugged granite range of the Marrah, which sends down many streams, forming on the W. the feeders of Lake Tchad, but on the E. shortly losing themselves in the waste. The fertile valleys in the Marrah Hills produce dates, rice, bananas, citrons, onions, cucumbers, pepper, hemp, cotton, tobacco, &c. There is also much copper and iron; the copper takes a prominent part in the commerce of the entire Sudan. Among the wild animals are the lion, panther, hyæna, elephant, rhinoceros, wild ox, gazelle, and monkey. The Furs are an intelligent, active, well-built people, with straight hair and thin lips, speaking a language that contains a large infusion of Arabic words. Mohammedanism has prevailed in D. since the middle of the 18th c. Tendelty is the capital (pop. 8000), and the other chief towns are Kobbe, Zeghawa, and Gija. D., which has of late years been a great centre of the slave trade, was annexed by Egypt in 1874-75. See Ebn-Omar-el-Tounsy, *Voyage au D.* (Par. 1845).

Dar'gan, William, a projector of railways, born about 1800, at Carlow, Ireland. After working in a surveyor's office, and under Telford in England, he returned to Ireland, where he engaged in the chief engineering schemes, and amassed a large fortune. He was the contractor for the Dublin and Kingston Railway, the first line laid in Ireland, and was the main promoter of the Dublin Exhibition of 1853, to which he contributed £20,000. D., who was an enterprising and public-spirited man, died February 7, 1867.

Da'rien, or **Uraba, Gulf of**, the most southerly arm of the Caribbean Sea, United States of Colombia, 170 miles from N. to S., and 125 across. On its western side, near its southern extremity, its chief tributary, the Atrato, empties itself into the Bay of Choco. The **Isthmus of D.**, more generally known as the Isthmus of Panama (q. v.), of which, however, it is properly a continua-

tion, is in one point only 30 miles across. Two schemes have been proposed to traverse it by a ship-canal, and thus afford direct communication between the Atlantic and Pacific Oceans. The one contemplates the junction of the Gulf of D. with that of San Miguel, on the western side of the isthmus, and the other that of the Atrato (q. v.) with the San Juan. A railway across the isthmus was completed in 1854. See ASPINWALL.

Darien, Scheme, The, a disastrous commercial enterprise projected on behalf of Scotland by William Paterson, founder of the Bank of England, who hoped, by planting a colony on the Isthmus of Darien, to form a connecting mart between the eastern and western hemispheres. In the year 1695, when Paterson disclosed his grand scheme, Scotland was the poorest country in Europe. The occupation of D. promised to render it a warehouse for the wealth of the East. The magnificence of the project greatly excited the people, and led them to overlook the obstacles to its execution. Colonists unaccustomed to a high temperature even in summer were unfit to endure labour under a tropical sun. It was improbable that Spain would tolerate a Scotch colony in the heart of its transatlantic dominions, or that England would incur a war with Spain for the benefit of Scotland; nor could Scotland, without the help of England, successfully oppose Spain in America. To do so, a navy required to be created, and an armed force sufficient to defend the isthmus against the vice-royalties of Mexico and Peru must be sent out. However, the Company was constituted by Act of Scotch Parliament, to which the Lord High Commissioner gave the royal sanction on 26th June 1695. The shares were fixed at £100 each. £400,000 was immediately subscribed for, of which £220,000 was paid. This may seem a small sum considering the national excitement; but if it be remembered that the whole amount expected to be paid into the imperial exchequer by Scotland at the date of the Union (1707) was but £151,000, the £220,000 seems sufficiently large. The Duke of Hamilton, the Duke of Queensberry, and Lord Belhaven took £3000 of stock each. The Duke of Argyle took £1500 worth. The cities of Edinburgh and Glasgow took each £3000 worth, and the city of Perth £2000.

On 25th July 1698, five ships with 1200 men sailed from the Forth, and on the 1st of November following anchored near the isthmus. For a few months matters went fairly; but with the approach of spring the malignity of the climate began to tell with fearful effect. Supplies gradually failed, and none were to be had from neighbouring colonies. The Spaniards began to arm against the new settlement. The French dependencies eagerly offered assistance to the Spaniards. In England, both Houses of Parliament petitioned the King against the scheme. In consequence, the governors of the English colonies prohibited all intercourse with a swarm of adventurers. Meanwhile in Scotland the mania was rising still higher. The riches of the country, in the words of a newspaper of the day, were great beyond imagination. In August 1699 four ships with 1300 men were despatched by the Company to the New Caledonia. These were charged by the General Assembly to divide the colonists into congregations, to appoint ruling elders, to constitute presbyteries, and to labour for the propagation of divine truth among the pagans of Darien. This second expedition found, in place of a colony, a wilderness. The castle of New Edinburgh was in ruins. The huts had been burned, and the site marked out for the new capital was now a jungle inhabited by wild beasts. A fleet of eleven Spanish vessels anchored off New Edinburgh, while an army of Spaniards and Indians blockaded the fort by land. Before the end of March a treaty was signed, by which the Scotch bound themselves to evacuate Darien in fourteen days; and on the 11th April 1699 they departed. Few of the survivors saw their native land again. Many hired themselves as labourers to the planters of Jamaica. Two of the ships were lost on the voyage home. The books and documents of the Company may be seen in the Advocates' Library, in Edinburgh. See Burton's *Account of the D. S.*, printed for the Bannatyne Club.

Dari'us (Gr. *Dareios*, anc. Pers. *Dareush* or *Daryush*; the mod. Pers. *Dara* or *Darab*, means 'lord'), was the titular designation of several Persian kings, and probably meant *the ruler*.—**Darius I.**, eldest son of Hystaspes, satrap of Persia, with six fellow-conspirators, murdered the false usurper Smerdis the Magian. The conspirators determined to adopt the monarchical form of government, and D., by a well-known device of his groom, was chosen king, B.C. 521. D. strengthened his position by marrying the two daughters of Cyrus, the daughter of Smerdis, and the daughter of Otanes, the chief conspirator. He divided his empire into twenty satrapies, and settled the tribute to be paid by each—a work of great difficulty, in consequence of the previous remission of taxes by Smerdis for a period of three years. The Babylonians revolted, but after a siege of twenty months, their city was taken by the stratagem of Zopyrus, about B.C. 516. Three years afterwards D. invaded Scythia, crossing the Thracian Bosporus with immense forces, but the expedition completely failed. Incensed at the aid given by the Athenians and Eretrians to the Ionian provinces in their revolt against him, D., B.C. 492, sent Mardonius to subdue Greece, but the fleet was wrecked in a storm off Athos, and a great portion of the army was slaughtered by the Brygians in Thrace. A second expedition was despatched under Datis and Artaphernes, which reached Europe in safety, only to suffer complete defeat at Marathon, B.C. 490. D. made every effort to renew the war, but death ended his projects, B.C. 485.—**Darius II.**, surnamed successively *Ochus* and *Nothus*, was one of the seventeen bastard sons of Artaxerxes I., Longimanus. He declared war against Sogdianus, who had murdered Xerxes II., and was chosen to succeed him on the throne. D. was completely subject to his eunuchs and to his wife Parysatis; and his reign was a succession of insurrections, of which the chief was that of Amyrtæus in Egypt. D. died B C. 405-404.—**Darius III.**, surnamed *Codomannus*, owed his elevation to the throne to the murder of Arses by Bagoas, B.C. 336. He was distinguished alike by moral excellence and personal beauty. Bagoas, foiled in an attempt to poison his sovereign, himself perished by poison. D. vainly tried to oppose the advancing power of Alexander. After the battle of Arbela, B.C. 331, he fled before the Macedonian conqueror, and after renewed efforts to retrieve his fortunes, was perfidiously murdered by Bessus, satrap of Bactria, B.C. 330.

Darjeel'ing, or **Darjiling**, a sanitary station for British troops in an executive district of the same name, Cooch Behar, province of Bengal, British India, 7400 feet above the level of the sea. Though the atmosphere is humid, and there is an annual rainfall of 120 inches, the climate is healthy. Pop. (1872) 3157. D. was acquired from the Rajah of Sikkim in 1835.—The *district* of D. is noted for its extensive and profitable cultivation of the tea-plant, and has an area of 1234 sq. miles and a pop. (1872) of 94,712.

Dar'ling, a name of frequent occurrence in the geography of Australia, and derived from one of the early governors of New South Wales.—1. An important and remarkable river, formed by the confluence of the Bogan, Barwon, Bokhara, and Culgoa rivers, in about 30° S. lat., 146° 25' E. long. After its formation the D. receives scarcely any tributaries, the only noteworthy exception being the Warrego. The D. flows for 650 miles in a S.W. direction, till it unites with the Murray at Wentworth. Its banks are of soft earth, from 30 to 40 feet high, and are lined with lofty trees. The average breadth of the D. is 60 yards, but in flood-time it has been known to overflow its banks for a couple of miles. It flows through a vast and arid plain of clay, varied by grassy patches and swamps. The area of its basin is about 198,000 sq. miles.—2. A large pastoral district in the S.W. of New South Wales, watered by the rivers Darling and Murray, and estimated to contain an area of 50,000 sq. miles.—3. The D. Downs are an extensive district of splendid pastoral country, in the southern portion of Queensland. They measure about 120 miles by 50, are well watered, and will, in their best parts, carry one sheep to two acres in natural grasses.—4. The D. range of mountains in W. Australia extends N.W. from Point D'Entrecasteaux, in the extreme S.W., for 250 miles. Its highest point reaches an altitude of 3500 feet.

Darling, Grace, a heroic girl, daughter of the keeper of Longstone Lighthouse on the Farne Islands, was born at Bamborough, November 24, 1815. When the *Forfarshire* was lost among these islands on the 6th September 1838, Grace, then in her twenty-second year, persuaded her father to venture with her to the rescue. Amid imminent peril they gained the wreck, and saved the nine remaining on it. This noble action elicited general applause, which Grace did not long enjoy, as she died of consumption, October 20, 1842. See *Life of Grace D.*, by Eva Hope (Lond. 1876).

Dar'lington, or **Darn'ton,** a town in the county of Durham, on the Skerne, 17½ miles S. of Durham by railway. The streets diverge from a central market-place. The most noteworthy edifice is St. Cuthbert's Church, founded in 1169, with a spire 180 feet high. In 1874 there was established a British and Foreign School Society Training College at a cost of £15,000, and in the same year a fever hospital at a cost of £9225. In 1875 the foundation-stone of a new church was laid, to cost over £6000. The principal manufactures are carpets, flax, and wool-spinning; there are also tanneries, and brass and iron foundries. D. returns one member to Parliament. Pop. 27,729.

Darm'stadt, a town of Germany, the capital of the Grand-Duchy of Hessen, on the river D., 15 miles S. of Frankfurt-on-the-Main. It consists of an old and new town; the latter has two main streets, which cross each other at right angles, and contain many fine buildings; the former has narrow, ill-built streets. In the centre of the Luisenplatz, the finest public square, is a lofty Doric column, surmounted by a statue of the Grand-Duke Ludwig I. Other buildings of note are the old ducal palace, with a picture gallery containing many fine paintings, and a library of 450,000 volumes, the new palace, the residence of the Grand-Duke, the opera-house (burned in 1871), and the Roman Catholic church (a rotunda with twenty-eight Corinthian columns). D. has manufactures of carpets, carriages, tobacco, and machinery. Pop. with Bessungen (1871) 39,594. D. is mentioned as early as the 5th c., but first came to Hessen in 1479, and became the residence of the Landgrafs in 1567.

Dar'nel (*Lolium temulentum*), a genus of grasses common in cornfields in England and many parts of Europe. The grain has long been reputed poisonous, but recent researches have rather thrown doubt on this, and attribute its injurious properties to a parasitic fungus, or to some cause apart from the grain itself.

Darn'ley, Henry Stewart, Lord, eldest son of the Earl of Lennox, was born at Temple Newsome, in Yorkshire, 7th December 1546, was carefully educated under the eye of his mother, and displayed a distinct turn for literature. In 1565 he married his kinswoman, Mary Queen of Scots, who, it is commonly said, was attracted by his handsome appearance; but it is not improbable that the grand-nephew of Henry VIII. was reckoned a first-rate political match. He was nineteen when he arrived in Scotland to marry his cousin, she being then twenty-two and a half. A son, afterwards James VI., was born to them, 19th June 1566, and on the 9th of February 1566, before he had completed his majority, D. was murdered at the Kirk-of-Field, a lonely house outside the city walls, on the site of which stands the University of Edinburgh. A quaint, tender ballad ascribed to him is printed by Maidment in his *Scottish Ballads and Songs* (Edinb. Paterson, 1868). There can be little doubt that D. has been maligned by history.

Dar'ter, or **Snake-Bird** (*Plotus anhinga*), a genus of Natatores or Swimming birds, belonging to the sub-family *Plotinæ* and family *Pelecanidæ*. Their popular name is derived from their habit of moving their snake-like head and neck very quickly about as they rest amid the foliage of trees. They are found in Africa and America. The common D. is deep-green in colour, with a brownish-white stripe running from the eye down the sides of the neck. Its average length is three feet. The bill is straight and sharp. Levaillant's D. (*P. Levaillantii*) inhabits Africa. Both are expert fishers.

Dart'ford (Old Eng. *Daerentaford*, 'the ford over the Darent'), a town in Kent, on the river Darent, 17 miles by rail E.S.E. of London, with powder, paper, oil, and corn mills, iron-foundries, roller manufactories, and cotton and silk printing establishments. The first paper-mill in England was built here by Sir J. Spielman, who died in 1607. There still exist the ruins of an Augustine nunnery founded in 1375 by Edward III. Pop. (1871) 8298.

Dart'moor, a tableland in Devonshire, 22 miles from N. to S., and 20 from E. to W., with an area of fully 130,000 acres of heath, bog, and rock. Its highest elevation, Yes Tor, is 2050 feet above the level of the sea, but several other summits are nearly as high. Geologically it is for the most part of granitic formation, with rich veins of tin, copper, and manganese, and strata of Devonian slate and sandstone. Much of the soil is peaty, but it affords pasture to numerous cattle, sheep, and a small breed of horses known as Dartmoor or Exmoor ponies. D. is remarkable for the number of its British remains, including cairns, barrows, kistvaens, rock-pillars, and the Grey Wethers, a circuitous Druidical temple. D. Prison, erected in 1806 for French prisoners of war, is now a convict depot with (1871) 888 convicts and 20 officials. Numerous streams rise in D., among which are the Dart (from which it takes its name), Teign, Taw, Plym, and Avon.

Dartmoor Sheep are a small hardy race, wild and restless, whose original home is in the forest and heath lands of Devonshire and Cornwall. In size they are small, their average weight on killing being about 11 lbs. per quarter. Their mutton is highly esteemed for its flavour, and commands a ready sale. Their wool is soft and long, but of little bulk. They feed upon pasture too poor for the sustenance of other sheep, have white faces and legs; and when the ewes are crossed with Leicesters, heavy lambs are produced.

Dart'mouth, a seaport and market-town of Devonshire, 32 miles S.S.W. of Exeter, with which it is connected by railway. It is built in terraces on the face of a steep rock, and has its streets connected by flights of steps. The harbour is defended by a battery, and at its entrance are the remains of a castle built by Henry VII. The streets are narrow, and many of the houses are old, and decorated with wood-carvings. The harbour is commodious and safe. D. is a Channel quarantine port. Many of the inhabitants are engaged in the herring, pilchard, and stock fisheries, and the town has a good Mediterranean trade. Shipbuilding, ropemaking, and the manufacture of paper are carried on. Pop. (1871) 5338.

Dartmouth College, New Hampshire, U.S., was chartered in 1769. It grew out of an earlier Indian school, and received its name from Lord Dartmouth, president of the original trustees. In 1815–19 the college became the subject of litigation, a result of which was that the United States Supreme Court decreed the inviolability of chartered property. D. C. comprises an arts, medical, and scientific school, with an observatory. In 1870 there were 29 teachers and 289 students; in the medical department, 14 teachers and 52 students; income from endowments, $9000; other sources, $20,000.

Dartos, a thin layer of involuntary muscular fibre, endowed with contractility, found immediately beneath the skin of the scrotum. By its contractile action the testes are drawn up, and the skin of the scrotum is wrinkled.

Daru', Pierre Antoine Noel Bruno, Comte, an author and politician of the earlier Napoleonic period. Born at Montpellier, January 12, 1767, he became a soldier at an early age, and in 1791 was made intendant of the army of Brittany. He translated the Odes, Epistles, and Satires of Horace. During the Revolutionary period he was of little account, but became a favourite with Napoleon I., and was for a time his War Minister. After the return of the Bourbons, D. devoted himself to literature, producing excellent histories of Venice and Brittany. He died September 5, 1829.—His son, **Comte Napoleon D.,** the godson of Napoleon I. and the Empress Josephine, was born at Paris, June 11, 1807. Throughout life D., who is one of the best of French political economists, has been an Orleanist. After the *coup d'état*, he retired into private life, but keenly opposed the Second Empire. In 1870, however, he became Minister of Foreign Affairs under M. Ollivier, but retired from his post when the Emperor agreed to submit his fate to a *plébiscite*. D. did his best, as a member of the Committee of National Defence, and in his own department of La Manche, to drive off the German invaders, and in 1871 was returned to the National Assembly. He has written an important treatise *Des Chemins de Fer* (Par. 1843).

Dar'win, Eras'mus, was born at Elton, Nottinghamshire, December 12, 1731. After studying at Cambridge, and taking the degree of M.D. at Edinburgh, he settled at Lichfield, where he became celebrated as a physician, physiologist, and poet. He died at Derby, August 18, 1802. His scientific speculations are mostly erroneous but suggestive. His poetry, although occasionally brilliant, is in general tedious, fantastic, and mechanical. D.'s chief works are the *Botanic Garden* (1781), in two parts—first, the economy of vegetation, second, the loves of the plants (ridiculed in Canning's *Loves of the Triangles*); *Zoonomia* (1793–96);

and *Phytologia, or Philosophy of Agriculture and Gardening* (1800). See *Life of D.* (Lond. 1804), by Miss Seward.—**Charles D.**, one of the greatest of living naturalists, was born at Shrewsbury, February 12, 1809. His father was Dr Robert D., son of Erasmus D. After studying at Edinburgh University, and taking the degree of B.A. at Cambridge in 1831, he went round the world as naturalist in H.M.S. *Beagle*, returning to England in 1836. His interesting and popular *Voyage of a Naturalist* gives an account of this circumnavigation. In 1839 he published *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle*; in 1840-43, the *Zoology of the Voyage of H.M.S. Beagle*; in 1842, *The Structure and Distribution of Coral Reefs* (new ed. 1876); in 1846, *Geological Observations on S. America*; and in 1851-53, *Monograph of the Pedunculated and Sessile Cirrepedia*. These works gave him a wide and solid reputation, which was vastly extended in 1859 by the publication of a remarkable book *On the Origin of Species by Means of Natural Selection*. D. there contends that all existing species arose from pre-existing species, and probably from a primitive germ, through *natural selection*; the organisms best fitted for surrounding circumstances surviving, while the weaker disappeared in the *struggle for existence*. (See DARWINIAN THEORY.) He published *Fertilisation of Orchids* in 1862, *Variation of Animals and Plants under Domestication* in 1867 (new ed. 1876), and the *Descent of Man* in 1871 (new ed. 1874). In this work he seeks to prove that man is descended from 'a hairy quadruped with a tail, probably arboreal in its habits. His latest works are *The Expression of the Emotions in Man and Animals* (1872) and *Insectivorous Plants* (1875). D. is a member of many foreign and British scientific societies, and has received the Royal and Copley medals from the Royal Society, and the Wollaston Palladium from the Geological Society.

Darwin Mount, 6800 feet above the level of the sea, on the S.W. side of King Charles's South Land, Tierra del Fuego.—**D. Sound** is a channel between York Minster and Sandwich Rocks, on the S.W. coast of Tierra del Fuego.

Darwin'ian Theory, the theory of the origin and modifications of animals and plants promulgated by Charles Darwin. It takes as its basis the tendency to *variation* observed in the species of living beings, in virtue of which new *varieties*, merging into permanent *races*, are produced. This principle of variation will in turn affect the races, and from the variation of these latter, new races—which are so different from the original species as to entitle them to rank as new *species*—are evolved. Thus the D. T. is one of *evolution*. It holds the evolving of new races, and through these of new *species*, and thus does not allow for any secondary causes, or any purely *creative* influence. Such is the primary idea of Mr Darwin's theory, and, as subsidiary to this idea, he introduces the principle of *natural selection*, as that whereby the new races are first indicated. Thus 'nature,' according to Darwin, 'selects' and perpetuates the individuals of a species which have any peculiarities before those which resemble the species. And in perpetuating the points wherein such individuals differ from their neighbours, nature is initiating a new race and species, for the variations become reproduced and intensified as time passes. 'Artificial selection,' as practised by man in the breeding of cattle and sheep, in fact, imitates the 'selection' of nature. Again, the numbers of animals and plants produced are held to be far too numerous for preservation; and a perpetual 'struggle for existence' (*i.e.*, for food and the conditions of living) takes place amongst the various species of animals, and amongst the individuals of each species. The individuals which tend to variation are those which nature will 'select' for preservation before the others; and this variation results in the evolution of new races and species. Then, granting that time past has been infinite, there can be theoretically no reason why all the diverse and existent types of life should not have been evolved from pre-existing types and species, or primarily from a few primitive beings; or from one primeval organism. The subsidiary theory of 'sexual selection' is founded on the belief that males and females may select their mates from advantages or peculiarities in colour, &c., and that this process will give rise to variation.

The chief objections to this ingenious theory are founded: (1) on the inability of 'natural selection' to account for the *origin* or *initiatory stages* of variations; (2) that variation may be *destructive* to individuals; (3) that variations, to be perpetuated, must not occur in detached instances, but in very many cases; (4) on the occurrence, without variation, in Darwin's sense, of differences in some species; (5) that variation cannot be proved to be of *indefinite* extent, but that it is highly probable that limits to the variation of every species exist; (6) that palæontology does not supply fossil organisms to fill up the structural gaps between living species, and so complete the continuous succession of organisms required by the D. T; and (7) that past time, as calculated by physicists, would not have sufficed for the slow evolution of the existing races.

The whole matter is as yet hypothetical in its bearings and nature. Subsequent research and the lapse of years alone can prove its truthfulness or falsity. See the works bearing on the theory, as mentioned in article CHARLES DARWIN; also Herbert Spencer's *Principles of Biology* (1864) and *Spontaneous Generation*, &c. (1870), which show the extension of the principle of the theory; and St George Mivart's *Genesis of Species* (1876), which sets forth the most feasible objections to the Darwinian hypothesis.

Dash'kov, Ekateri'na Romanov'na, a noted Russian princess, was born 28th March 1743. When eighteen years old she shared in the conspiracy which set the Empress Catharine II. on the throne. Her independent spirit led eventually, however, to a quarrel with the Empress, and she left Russia for European travel. In England she became known to Garrick, Blair, Robertson, and other eminent men. Having reconciled herself to Catharine, she returned to court in 1782, and next year founded the Russian Academy. On the Empress's death in 1796, the Princess lost her offices, and lived in retirement till her death, at Moscow, 16th January 1810. Besides composing several comedies and other works in Russian, she actively assisted in the publication of the Dictionary of the Russian Academy. See *Memoirs of the Princess D., Lady of Honour to Catharine II.*, by Mrs Bradford (2 vols. Lond. 1860).

Das'yure, in natural history, a group of carnivorous marsupials forming the family *Dasyuridæ*. They are now confined to Tasmania, though their fossil remains have been found on the mainland of Australia. They differ from the opossum (*Phalangista*) in their dentition, in their feet being formed for terrestrial progression, and in the tail being clothed with hair, and not prehensile. *Dasyurus ursinus*, the typical species, is 18 inches long, without the tail, and covered with coarse black hair. From its intensely savage disposition it is colonially termed the Tasmanian devil. It is nocturnal, and preys upon the smaller marsupials, but in a larger degree upon sheep, on which account it is rapidly being exterminated, and is now confined to the less accessible parts of the island. The Tasmanian wolf or tiger (*Thylacinus cynocephalus*) is a larger species of D., and resembles *D. ursinus* in its character and habits.

Date (Fr. *date*, Lat. *datum*, 'what is given'). To preserve an exact record of a succession of events, some fixed point of time or *epoch* must be assumed as the basis of the reckoning. In Scripture, time is measured by generations, or by the reigns of kings. Some Greek historians reckoned by the ephori and kings of Sparta, or by the archives of Athens. Three generations are usually held equivalent to 100 years. Newton counts the average of a reign or succession at twenty years. Before the invention of letters, the preservation of an exact record of the events which mark the lapse of time must have been impossible; to do so even now is difficult. The Christian era is universally employed in Christian countries. It begins on 1st January in the fourth year of the 194th Olympiad, and in the 753d from the legendary foundation of Rome. The Mohammedan era, called the Hegira (q. v.), begins with the flight of Mohammed, A.D. 622. A knowledge of the epochs at which the world has been held to begin in different countries and ages is indispensable to the student of history. For example, the English Revolution, known as the Revolution of 1688, would have been the Revolution of 1689 had the year then begun on 1st January; the event having taken place in February of the year which would have been 1689 but for the fact that then the year began with 25th March. There was but one calendar in use in Europe, until Pope Gregory introduced the 'Gregorian Calendar' in 1582. It rectified an accumulation of error by striking ten days—5th to 15th October—out of the year 1582. The new style was at once generally adopted in Roman Catholic countries, but the 'old style,' or Julian Calendar, remained in use for a long time in Pro-

testant countries; it is still followed in Russia and Greece, and in many Eastern countries. In Great Britain, the alteration of the style was long successfully opposed by popular prejudice; but in 1751 an Act of Parliament was passed for the adoption of the new style in public and legal transactions. The difference of the two styles, which was then eleven days, was removed by ordering the day following 2d September 1752 to be counted the 14th September. At the same time the first day of the legal year was changed from 25th April in England to 1st January. In Scotland, by an Act of the Scotch Privy Council of 1599, the year 1600 was appointed to begin on the 1st January; 25th March having been previously held as the first day of the year in Scotland. The following are valuable works on the subject of dates—*L'Art de Vérifier les Dates*, compiled by the Benedictines (1783-1820, new ed. 1818-44); *Playfair's Chronology* (1784); *Blair's Chronology* (new ed. by Sir H. Ellis, 1844, and by Mr Rosse in 1856); *The Oxford Chronological Tables* (1838); Sir Harris Nicolas' *Chronology of History* (new ed. 1852); *Hales' Chronology* (1830); H. Fynes Clinton's *Fasti Hellenici et Fasti Romani* (1824-50). Dates were affixed to grants and assignments by 18 Edward I., 1290. Before this time it was usual at least to pass lands without dating the deed of conveyance (Lewes). Numerous instruments of assignments enrolled among our early records establish this fact (Hardie). See CHRONOLOGY, CALENDAR, YEAR, MONTH, DAY, CYCLE.

Date Palm (*Phœnix*), a genus of palms, of which about a dozen species are known, all, with the exception of two found in South-Eastern Africa, confined to Northern Africa and tropical Asia. The D.-P. (*P. dactylifera*) is largely grown over Northern Africa, and more sparingly in Western Asia and Southern Europe. In some countries it is the chief food of the inhabitants, as well as of horses and camels. The poor construct huts of its leaves; ropes and coarse cloth are made of the fibre surrounding the base of the leaves; the stalks are used for crates, baskets, brooms, and walking-sticks; houses are built of the wood; the buds are eaten as potherbs; *lagbi*, an intoxicating drink, is made from the sap, and the date stones are ground into food for camels. *P. sylvestris*, common over India, is the 'wild date,' and by some is believed to be the parent of the cultivated one. 'Toddy' is obtained from it by cutting off the young flower-spike, and date-sugar, much used in India, by boiling this juice. It is said that 130,000,000 lbs. are annually extracted from it in India, and that 220,000,000 lbs. is the annual quantity of palm-sugar obtained. *Arrack* (q. v) is toddy distilled. *P. paludosa*, a gregarious Indian species, covers considerable tracts. *P. acaulis*, *farinifera*, and *spinosa* are dwarf species, the first being found in the damp valleys of the Himalayas, at 5000 feet elevation. From *P. farinifera* an inferior kind of sago is extracted. The name is derived from the Fr. *datte*, Gr. *daktylos*, from its supposed resemblance to a *finger*.

Date-Plum (*Diospyros*), a genus of Deciduous trees of the Ebony order (*Ebenaceæ*). Above a hundred species are known, mostly natives of Asia and the Mauritius, while about a dozen are found in America, and three or four in Africa. Nearly all are confined to the tropics - a few extending as far N. as 44°. Ebony (q. v.) and the various kinds of wood known as ironwood are the produce of this genus. Others are valued for their fruit. The common D.-P., pishamin, European lotus, or date of Trebizond (*D. Lotus*), is a tree 20 to 40 feet in height, a native of the coasts of the Caspian, and now cultivated in the S. of Europe for its yellow, sweet, astringent fruit, about the size of a cherry. It bears well in the S. of Britain. The persimon (probably a corruption of *Pishamin*), or Virginian D.-P. (*D. Virginiana*), attains a height of 50 or 60 feet, and produces wood hard and elastic, though liable to split. The fruit is astringent, but when mellowed by frost is eatable. It is pounded and made into cakes with bran, from which, by adding yeast and water, a kind of beer is brewed, or by fermenting, a spirituous liquor. The bark is bitter, febrifugal, and has been employed with success in infantile cholera and diarrhœa. The Chinese D.-P., or *Kaki* (*D. Kaki*), is dried and cured by the Chinese to make sweetmeats, called *Figues-caques* in France. The fruit of *D. decandra* is sold in the markets of Cochin-China.

Datisca'ceæ, a small natural order of Dicotyledonous plants, containing four species and three genera of herbs and trees, distributed over N. America, Northern India, Siberia, the Malayan Islands, and the S.E. of Europe. Except the *Datisca cannabina* of Crete, &c., the root of which is employed in Cashmere as a yellow dye, the order has no economical qualities.

Da'tive. See DECLENSION.

Datu'ra. See THORN-APPLE.

Daubenton, Louis Jean Marie, a French naturalist, born at Mont Bar, in Burgundy, 29th May 1716. After a youth spent in the study of theology and medicine, he was associated with Buffon (whose sight was now failing) at the Jardin du Roi. D., who was made curator and demonstrator in the Cabinet of Natural History, did the measurements, the dissections, the calculations, in fact, the whole anatomical description in the part of the *Histoire Naturelle* relating to mammalia—*i.e.*, the first fifteen volumes. A coolness then arose between the two friends, which was afterwards removed. D.'s laborious accuracy was a useful check on the brilliant generalisations of Buffon. Besides arranging the large collections of the Cabinet, D. took up the subject of fossil remains. He wrote the general subject of natural history for the *Encyclopédie Méthodique*, and communicated, between 1754-64, many papers on minerals to the Academy of Sciences. He held chairs of Natural History and Mineralogy under the Revolution. He died 1st January 1800. He interested himself in rural economy, and the introduction to France of Spanish sheep. His character was very simple and modest, but his scientific eminence is undisputed. See Cuvier, *Notice sur la Vie et les Ouvrages de D.* (in the *Mémoires de l'Institut*, t. iii).

Dau'beny, Charles Giles Bridle, M.D, F.R.S., Professor of Botany and Chemistry in Oxford University, is best known for his investigations into the chemistry of volcanic action. Most of his works relate to such phenomena, and those most worthy of mention are *A Description of Active and Extinct Volcanoes* (1826), *A Notice of the Thermal Springs of N. America* (1838), and *A Sketch of the Geology of N. America* (1838). His *Lectures on Agriculture* (1841) and *Climate* (1862) are the most valuable of his other publications. D. died December 12, 1867.

Dau'cus. See CARROT.

Daum'ier, Henri, was born at Marseilles in 1810. He has became known in France as a telling caricaturist. Many of the happiest sketches in *Charivari* on the political events and leading public men of the time have been due to his fertile and playful genius. Among his productions are *Les Philanthropes du Jour*, *Idylles Parlementaires*, *Les Bons Bourgeois*, *Les Représentants Représentés*, inspired by the Revolution of 1848.

Daun, an old and illustrious Austrian family, originally from the neighbourhood of Trier. The ancestral castle occupied a rock near the little town of D., whence the family name. As early as the 11th c. the Dauns were conspicuous in political life. One branch of the family settled in Austria in the 17th c. Its most famous member was **Leopold-Joseph-Maria, Graf von D.**, Austrian field-marshal, who was born at Vienna, 24th September 1705. In the war with the Turks (1737-39) and in the later war of the Austrian succession he greatly distinguished himself, and was made field marshal for his services in the campaigns against the French in the Netherlands in 1746-48. D. reorganised the Military Academy at Vienna, and materially modified the Austrian military system. As imperial commander-in-chief in the war with Friedrich II., D. showed himself a truly great commander, triumphing over the Prussians at Kollin, Hochkirchen, &c., and compelling Friedrich to raise the siege of Prague, Dresden, and Olmutz. Ultimately D. suffered defeats at Leuthen, Torgau, Burkersdorf, Reichenbach, &c. Carlyle (*Friedrich*, vol. vi. p. 375) calls him 'an honourable, imperturbable, eupeptic kind of man.' D. died 5th February 1766.

Dau'phin (Lat. *Delphinus*), formerly the title of the eldest son of the King of France, but originally given in the 12th c. to Guigo, lord of Vienne in Dauphiné, and continued to succeeding Comtes of Vienne. In 1349 the childless Humbert II. made Charles of Valois, grandson of Philippe VI. of France, his heir, on condition that the heir-apparent to the crown should bear the title of *Dauphin de Viennois*. The title was abolished after the Revolution of 1830.

Dau'phiné, formerly a province of France, comprising the present departments of Hautes-Alpes, Isere, and Drôme. After

forming a part of the first Burgundian kingdom, the monarchy of the Karolings, and the second Burgundian kingdom of Arles, it was in 1032 bequeathed by Rudolf III. to the German Emperor, and remained along with the rest of Burgundy in the closest union with the German Empire till 1349, when Humbert II., the territorial lord, transferred the sovereignty to France. See DAUPHIN.

Dauphin's Crown, a circle of gold surrounded by eight fleurs-de-lis, and surmounted by four dolphins.

Dauw, Peechi, or Burchell's Zebra (*Equus* or *Zebra Burchellii*), a species of *Equidæ* or Horses, allied to the true Zebra (q. v.), and found in S. Africa, particularly S. of the Orange River. The stripes on the body are not so black as those of the zebra, and do not extend all down the limbs as in the latter, but are confined to the head, body, and upper portions of the legs. The D. cannot be thoroughly tamed or domesticated.

D'Av'enant, Sir William, poet and dramatist, born in 1605 at Oxford, where his father was an innkeeper, was educated at Lincoln College, and became page to the Duchess of Richmond. His first play, *Albovine, King of the Lombards* (1629), was followed by other dramas and masques. On Ben Jonson's death, in 1638, D. became laureate. He lived a chequered life until the Restoration, which secured his fortunes; and he continued to manage the theatre and write plays till his death, 7th April 1668. D.'s merits as a poet have been somewhat overlooked. His epic, *Gondibert*, contains ingenious thinking happily expressed, and some of his lyrics are graceful and spirited. See Wood's *Athenæ Oxonienses*, and Maidment and Logan's edition of his *Dramatic Works*, (4 vols. Edinb. 1872-74). — **Dr. Charles D'A.**, son of the preceding, a writer on political economy, was born in 1656 and died in 1714. Among his works (a selection of which was published in 5 vols. 8vo by Whitworth in 1771) are *A Discourse upon Grants and Resumptions* (1700), *An Essay upon the Balance of Power*, &c.

Dav'enport, a city of Iowa, U.S., on the right bank of the Mississippi, below the upper rapids. It is built at the foot of a bluff opposite to Rock Island City. The river is here spanned by a railroad bridge 1582 feet long, and 21 feet above high-water mark. D. has two colleges, one for males and another for females, flour and saw mills, breweries, foundries, coach, locomotive, soap, and candle works. The place was settled in 1836. Pop. (1840) 600, (1850) 1848, (1870) 20,038.

Davenport, Rev. John, a distinguished Puritan divine, was born at Coventry, in England, 1598. He was educated at Oxford, became minister of St Stephen's, London, and went over sea with the first Puritan settlers of New Haven, Connecticut, in 1638. He remained their minister for thirty years, and died in Boston in 1670.

Dav'entry (Celt. *Dwy-avon-tree*, 'the town of the two rivers'), also **Daintree** ('the town of the Danes'), a municipal borough in Northamptonshire, 13 miles W. of Northampton, between the rivers Leam and Nen, and near the Grand Junction Canal Whipmaking and shoemaking are the chief industries. Before the time of railways it was a great thoroughfare for the N.W. of England, and as many as eighty coaches passed through it daily. Pop. (1871) 4051. At Danes' Hill, half a mile from the town, is one of the largest encampments in England. In the neighbourhood is the battlefield of Naseby.

Da'vid (Heb. 'the beloved'), King of Israel, was the youngest son of Jesse. He first appears on the scene when he was anointed king by Samuel (1 Sam. xvi.), and about the same time was sent for to soothe King Saul (q. v.) by playing on the harp. Yet there is another account of his *first* introduction to Saul in chap. xvii., apparently by another writer, who was ignorant of the events recorded in chap. xvi. According to the narrative, D. was admitted into the palace, received Michal, Saul's daughter, to wife, and contracted a remarkable friendship with Jonathan, his son; but owing to the jealousy and hatred of Saul, was soon obliged to flee. He fled first to Achish, King of Gath, and being discovered by the Philistines to be the slayer of Goliath, escaped their vengeance by feigning madness. After staying there about sixteen months (1 Sam. xxvii. 7), he betook himself to the Cave of Adullam, gathered a band of from 400 to 600 outcasts, and led the life of a freebooter for above twenty years. (Samuel, who was alive at the time of his flight, 1 Sam. xix. 18, died in the eighteenth year of Saul's reign—Jos. Ant., vi. 13, 5; and Saul reigned forty years, Acts xiii. 21—which gives at least twenty-two years.) On the death of Saul, D. became king of his own tribe of Judah (2 Sam. ii. 4), while the other tribes elected Ishbosheth, Saul's son. Chiefly through the influence of Abner, the general of Ishbosheth's army, who deserted his master, and then by the assassination of that prince, D. became King of Israel seven years after. He fixed his capital at Jebus, hitherto held by the Canaanites, under the name of Jerusalem (q. v.), where he reigned till his death, thirty-three years after. Under D. the empire of the Israelites rose to the zenith of its power, being extended, by the conquests of neighbouring tribes, from the Euphrates to the Mediterranean, and his reign was ever afterwards looked back to by his countrymen as the golden age of the national history. D.'s complex character is the grandest in the Old Testament, though there are stains on its glory. He leaves on us the impression of a nature aglow with religious, poetic, and patriotic enthusiasm; he was capable of the tenderest and most romantic sentiments, though inflexible, and at times even cruel, in the execution of his purposes. He combined the chivalry of the hero-king with the clear insight of the statesman and the rapt fervour of the poet, the prophet, and the devotee. His lyrics hold the foremost place in devout literature. One cannot imagine a time when they will cease to be an inspiration and a solace to Christendom. The variety, breadth, and depth of religious experience which they contain furnish the best reason for regarding David, with all his imperfections, as the truest and noblest type of Christ in Old Testament history. In deep tragic knowledge of the human heart none of the Hebrew saints and sages come so near to the 'Man of Sorrows.' The whole Christian Church has practically admitted this, for, next to the words of our Lord himself, it has always reckoned the 'Psalms' (q. v.) to be its most precious heritage of spiritual truth. See Ewald's *Geschichte des Volkes Israel* (Eng. transl. 1869).

David I. (sometimes called **St David**, though never canonised), King of Scotland, was the third son of Malcolm Canmore by the English Princess Margaret, sister of Eadgar Ætheling. He was born about 1080, and passed his youth at the English court, together with his sister Eadgyth, who was married to Henry I. of England. D.'s eldest brother, Eadgar, who died in 1107, and was succeeded by his next brother, Alexander, separated the principality of Strathclyde from the rest of the kingdom, and conferred it on D., and by his marriage in 1108 with Matilda, heiress of Waltheof, Earl of Northumberland, he became Earl of Huntingdon, and was thus not only heir to the Scottish crown, but a powerful English noble. He now became intimate with the Norman knights of England, which in the sequel powerfully influenced the course of Scottish history; for having quelled an insurrection of the men of Moray, he dealt with the territory of the subjugated chief as a feudal forfeiture, and portioned it out among Norman strangers, who thus became crown vassals. In 1124 he succeeded his brother Alexander on the Scottish throne. In 1127, as Earl of Huntingdon, he swore to Henry I. to support the right of Henry's daughter Matilda to the English crown, and when Stephen of Blois seized it, D. invaded England, and took possession of all the strongholds of the N. except Bamborough. Stephen advanced to meet him with a formidable force, but an agreement was made, by which David's son Henry was invested with his English fiefs, and the claim to Northumberland left open. An insult to Henry at the English court induced D. to ravage the northern counties in 1138; but being deserted by Bruce, Baliol, and other Norman barons, his motley force of Scots, Picts, Orcadians, Strathclyde Britons, English of Lothian, and Normans, was signally defeated at the famous 'Battle of the Standard,' near Northallerton. In 1139 peace was concluded at Durham, and Prince Henry made Earl of Northumberland. Two years later D. invaded England in favour of his niece, and narrowly escaped being taken prisoner. The close of his life, otherwise tranquil, was saddened by the death of his son Henry. D. died at Carlisle, 24th May 1153, and was buried at Dunfermline. D., like all the children of St Margaret, was devoted to the Church. He began the establishment of the bishopric of Glasgow while he was yet Prince of Strathclyde. In his reign were founded or enlarged the bishoprics of Dunkeld Moray, Aberdeen, Ross, Caithness, Brechin, Dunblane, and Galloway; and to the same time also

belong the religious houses of Holyrood, Melrose, Jedburgh, Kelso, Dryburgh, Newbattle, and Kinloss. He increased the number of royal burghs, and granted many privileges and immunities to the burghers. Latin culture first found a home in Scotland under his munificent patronage, and to him may be ascribed the decisive completion of that civilising policy, begun by his father, which saved Scotland from the rude rule of the Celt. See *Eulogium Davidis Regis Scotorum*, by Æthelred, Abbot of Rievaulx, printed in Pinkerton's *Vitæ Antiquæ Sanctorum Scotiæ* (Lond. 1789).

David II. See Bruce.

David, Jacques Louis, born at Paris, 31st August 1748, was trained to be an architect. He learned painting in the studios of Boucher and Vien. In 1775 he gained the grand prize of Rome, in which city he spent the next five years, chiefly drawing from the antique. He then began to paint subjects chiefly classical: his 'Horatio' being his best before the Revolution. The Constituent Assembly and the National Assembly (of which he was a member) commissioned pictures from him for the nation, and he arranged the artistic effects in the fêtes. His friendship for Robespierre caused his imprisonment for a year in 1794. The murders of Marat and Pelletier were commemorated by D. in two pictures. In 1799 his 'Rape of the Sabines' was completed. Napoleon made D. his first painter, and sat for the famous portrait in which he is ascending Mount Bernard on horseback. His official pictures for the throne-room at the Tuileries were of inferior merit. Banished by the law of 16th January 1816, and expelled from the Institute, D. went to Brussels, where he painted 'Mars Disarmed by Venus,' 'Cupid and Psyche,' &c., and where he died, 29th December 1825. See Miel's *Notice sur J. L. David* (1834), and Delecluze's *David et son École* (1855).—**Pierre Jean D.**, born at Angers, 12th March 1789, first came into notice about 1810, when he carried off the Academy prize by a bas-relief of 'Epaminondas.' After studying at Rome, he established his reputation as a sculptor by the statue of the 'Grand Condé' for Versailles. In 1826 he became Professor at the School of Painting, and in 1831 commenced the sculptures of the Pantheon. He sat in the Constituent Assembly of 1848, and was banished temporarily in 1851. He died 5th January 1856. Among his bas-reliefs may be mentioned the 'Marches Militaires' for the Hôtel de Ville, Paris; among colossal medallions, 'Casimer Périer' and 'G. St Hilaire;' among busts, 'Washington,' 'Béranger' 'Bentham,' 'Humboldt,' 'Göthe,' 'Rossini;' among statues, 'Cuvier,' 'Jean Bart,' and 'Talma;' the tombs of Generals Foy and St Cyr at Père la Chaise, and the monument to Botzaris at Missolonghi.—**Félicien D.**, a French musical composer, was born March 8, 1810, at Cadenet, Vaucluse. He was educated among the Jesuits at Aix, where he became a chorister, and in 1830 was admitted to the Conservatoire, Paris, having shown his compositions to Cherubini, who was then director of that institution. D. advanced rapidly in his musical studies; but in 1831 quitted the Conservatoire, and joined the Saint-Simonians, for whom he composed several hymns. On the breaking up of that fraternity D. travelled to the East, and on returning to Paris in 1835, published unsuccessfully *Mélodies Orientales*, which he had composed during his travels. His succeeding works, such as *Le Pirate* and *Les Hirondelles*, attracted slight notice; but in 1844 his *Ode-symphonie, Désert*, had a brilliant reception, and spread his fame through Europe. Later he composed *Christophe Colomb* (1847); *L'Eden* (1848); *La Perle du Brésil*, a comic opera (1851); *Herculaneum*, an opera (1859); and *Lalla Rookh*, a comic opera (1862). In 1869 he was made librarian to the Paris Conservatoire de Musique. He died 29th August 1876.

David, a prosperous town on the left bank of a river of the same name in Panama, United States of Colombia, on the frontier of Costa Rica, with a pop. of upwards of 5000, and exports of rice, coffee, hides, and gold-dust.

David, St, or **Dewi**, the patron saint of Wales, was born about the end of the 5th c., and, according to Giraldus Cambrensis, was the reputed uncle of King Arthur. He succeeded Dubricius as Archbishop of Caerleon, the head of the Welsh Church, but to avoid the inroads of the English, transferred the see to Menevia, thence called St David's (q. v.). D. founded several churches in Wales, strongly combated Pelagianism, and was famous for sanctity and eloquence. Many miracles are recorded of him, as of the ground rising beneath him while he was preaching, and of a spring at St David's gushing forth in response to his prayer. He died about 600. Many Welsh churches were dedicated to him. See *Historia S. Davidis* by Giraldus Cambrensis.

David's, St (the British *Mynyw* and Roman *Menevia*), a very old episcopal city, Pembrokeshire, Wales, near the rugged promontory of St David's Head, the westmost point in Wales. About 519, St David, the patron saint of Wales, transferred the metropolitan see from Caerleon to St David's, which during the middle ages was an important city, from the numerous pilgrims attracted to it by the sanctity of the shrine, and the rich offerings brought by them. It is now only an insignificant village, with a pop. in 1871 of 2155. The cathedral, the bishop's palace, St Mary's College, and some ruins, occupy a space surrounded by a lofty embattled wall more than three-fourths of a mile in circuit. The cathedral, founded in 1180, is cruciform, and generally in the Transition Norman, though Early English and later styles occur in portions. It contains the tomb of the Earl of Richmond, father of Henry VII., and monuments of Giraldus Cambrensis, Anselm, and other early bishops. Not the least distinguished of its many eminent bishops was the late Connop Thirlwall, the historian of Greece. See the *History of the Cathedral of St D.* by E. Freeman and Basil Jones.

Da'vies, Sir John, son of a lawyer at Westbury, Wiltshire, was born in 1570. He studied at Oxford, and was called to the bar in 1595. Next year he published a poem on dancing, called *Orchestra*. In 1598 his irregularities led to his expulsion from the Middle Temple, when he went to Oxford, and wrote his chief poem, *Nosce Teipsum*, treating of the immortality of the soul. In the reign of James I, D. filled the highest legal offices in Ireland, and in 1613 was Speaker of the Irish House of Commons. He sat in the English Parliament in 1620, and died December 7, 1626. D.'s legal and political works, of which the chief is *A Discovery of the True Causes why Ireland has never been Subdued until the Beginning of this Reign*, are of high value, but his poems more markedly display his ability. His verse is harmonious, the language choice, and the thought just and often philosophic.

Dav'ila, Enrico Caterino, born near Padua, 30th October 1576, belonged to a family driven from Cyprus by the Turks. Catherine of Medici was his godmother. After the death of Henri III. and the capitulation of Paris, D. served five years under the banner of Henri IV. He then occupied a high military and civil post at Venice. D. was assassinated in 1631. The best edition of his *Historia delle Guerre Civili de Francia* is that of Milan (6 vols. 1807). There is a French translation from the Italian by Mallet de Grosley (1757). Although biassed in favour of his godmother, D. gives an elegant and truthful account of the period (1559-98). He stands below Machiavel and Guicciardini, but above Sarpi and Bentivoglio.

Da Vin'ci, Leonardo, the chief of the Florentine painters, and, according to Hallam, 'the first name of the 15th c.,' was the illegitimate son of Piero Antonio, a notary, and was born in the Val d'Arno in 1452. Noted from early youth for his beauty and artistic promise, he was trained by Verocchio, then the greatest artist in Florence, whom he soon surpassed in painting; and, moreover, devoted himself to sculpture, poetry, music, architecture, and mechanics. In 1483 he visited Milan, where he became designer of pageants for Ludovico Sforza, and painted his 'Last Supper' in the refectory of a Dominican church. This fresco, finished in 1497, is now only faintly visible. In 1498 the French took Milan, and D. returned in poverty to Florence. Henceforth his life was one of wandering. To the years 1498-1502, his most actively creative period, belong the works 'La Giaconda,'—the 'Vierge aux Rochers' of the Louvre,—his masterpiece, and the 'Battle of the Standard,' produced in competition with Michael Angelo, Raphael watching both artists as they worked. In 1514 D. revisited Rome, where, though a supreme political indifferentist, he was suspected of French sympathies by the anti-Gallican party, and accordingly turned to France at the invitation of Francis I., who gave him the Château de Clou in the valley of the Masse, where he died, May 2, 1519. There is an indefinable charm and mystery in his life and works; his genius is enigmatical as well as versatile and fascinating. He often trifled with his superb powers, losing himself in strange

fancies and intricate designs. He was the leader of the return to nature in the painting of the 15th c. (see RENAISSANCE), and fixed for ages the pictorial type of the Saviour. His paintings are marked by fondness for bizarre effects, by patient refined execution, by the subtle exotic beauty of his female faces, the modelling of which is said to be unequalled. His favourite subjects are moving waters and faces with a perplexing smile. D. undertook various architectural and engineering labours, led the water of the Adda to Milan, made a navigable canal 200 miles long, and planned vast schemes, such as the perforating of mountains and raising of great buildings. He carefully studied plants, crystals, and the stars, and anticipated many recent discoveries and inventions. His thirteen books of MSS.—written from right to left—are still unedited. See Vasari's *Le Vite de più eccellenti Pittori, Scultori e Architette*, the first edition of 1550, and also the new edition, Florence 1846-57, in which the history of D. is modified; Arsène Houssaye's *Histoire de Léonard da Vinci* (Par. 1867), an admirable book, the chief authority on D.; and Pater's *Studies in the History of the Renaissance* (Lond. Macmillan, 1873).

Da'vis, Jefferson, the leader of the greatest civil war of modern times, was born in Kentucky, June 3, 1808. He graduated at West Point Military Academy in 1828, and served in the Black Hawk War, 1831–32. D. became a cotton-planter and a keen advocate of that interest, entering the arena of Congress in 1845 as a 'Democrat.' He fought with distinction in the Mexican war, entered the U. S. Senate in 1847, and became Secretary of War under President Pierce (1853–57). D. had long championed state rights and slaveholding interests, and at length led on the secession of 1861. He was chosen President of the Confederate States for six years. After the collapse of the South he was taken prisoner at Irwinville, Georgia, May 10, 1865, and detained in Fortress Monroe for two years, but was included in the amnesty of 1868. D. now follows business pursuits, eschewing politics, and is engaged (1876) on a history of the war in which he played so conspicuous a part.

Davis, John, a celebrated navigator of the latter part of the 16th c., was born in the parish of Strake-Gabriel, near Dartmouth, Devonshire. He made three voyages between 1585 and 1588 in search of the N.W. Passage, discovering, in the first, the straits which bear his name. He subsequently accompanied Cavendish to the South Sea, made five voyages to the East Indies, in the last of which he was killed, December 29, 1605, by pirates off the coast of Malacca. D. invented a quadrant, which was subsequently superseded by Hadley's, and was the author of *The World's Hydrographical Description* and *The Seaman's Secrets* (both 1595). An account of his discoveries is given in Hakluyt's *Voyages* and in Harris's *Collection of Voyages*.

Davis, Sir John Francis, born in London, 1795, went to China in the suite of Lord Amherst, 1816, joint commissioner with Lord Napier in 1834 in arranging affairs with China, and British plenipotentiary to China, and governor and commander-in-chief of Hong-Kong, 1843-48. He was created baronet, 1845, and K.C.B., 1854. D. is one of the most authoritative writers on China, its people, and its recent history. His chief works are *Chinese Novels Translated* (Lond 1822); *Chinese Moral Maxims* (Macao, 1823); *The Chinese, a General Description of the Empire and its Inhabitants* (Lond. 1836–57); *China during the War and since the Peace* (Lond. 1852); *Chinese Miscellanies* (1865).

Davis Strait, discovered by John Davis (q. v.) in 1585, is the southern half of that great inlet of the Atlantic running N. between Greenland on the E. and Baffin's Land on the W. It is in lat. 60° to 70° N., and it varies in width from 160 to over 300 miles. It is the gate from the Atlantic to Baffin's Bay, Smith and Lancaster Sounds, &c., and though its western shores are hampered with heavy ice throughout almost the whole year, it is freely navigated (along the Greenland coast) by fleets of whalers during the summer months.

Da'vison, John, the author of the well-known *Discourses on Prophecy*, was born at Morpeth, 28th May 1777, and educated at Oxford, where, between 1810 and 1817, he was tutor of his college (Oriel), public examiner, and preacher at Whitehall. In 1826 he was made prebendary of Worcester, and shortly after rector of Upton-upon-Severn. He died 6th May 1834. D. had great learning and clearness of judgment. His *Discourses* were published in 1812.

Da'vit, on shipboard, a sort of crane, with a curved arm projecting outwards, placed in pairs at the sides and stern of a vessel to facilitate the raising and lowering of boats, and on which the boats are slung ready for any emergency. A stout beam of timber, fitted to the fore channel, for hoisting the anchor to the top of the bow without injury to the ship's sides from the flukes of the anchor, receives the same name.

Davout' (commonly, but inaccurately, written **Davoust**), **Louis Nicolas**, a celebrated French marshal and lieutenant of Napoleon, was born of a noble family at Annoux, in the old province of Burgundy, 10th May 1770. He studied at the military school of Brienne at the same time as Bonaparte, and entered the army in 1785. D. distinguished himself on numerous occasions, accompanied Bonaparte to the East, and contributed greatly to the victory of Aboukir (1799). In the Napoleonic campaigns (from 1805 to 1809), including the battles of Jena, Austerlitz, and Wagram, he played a most brilliant part, being rewarded with the titles of Duke of Auerstadt and Prince of Eckmuhl. Appointed Governor of Poland, he obtained an evil reputation by the harshness of his military despotism and by his personal rapacity. In the Russian campaign he gallantly supported his chief, and after the retreat from Moscow became Governor of the Hanse Towns, which office he held till the restoration of the Bourbons. After Bonaparte's return from Elba, D. was his War Minister, and commanded the army which capitulated under the walls of Paris. He was made a peer of France in 1819, and died June 1, 1823.

Da'vy, Sir Humphrey, a celebrated chemist, was born at Penzance, Cornwall, December 17, 1778. After a preliminary education he was apprenticed to a surgeon and apothecary in his native town in 1795, occupying his leisure time with the study of science, mental and physical. His first published experiments, upon the decomposition of carbonic acid by plants, appeared in the *Contributions to Physical and Medical Knowledge, Principally from the West of England*, edited by Dr Beddoes, who in 1798 made D. the superintendent of his Pneumatic Institute, then recently established at Clifton. Here he made his famous experiments in the respiration of nitrous oxide, nitric oxide, marsh gas, and carbonic acid, which, communicated to the Royal Society, obtained for him a great reputation as a chemist, and an appointment in 1801 as lecturer of chemistry in the Royal Institution at London. In 1806 his Bakerian lecture, *On Some Chemical Agencies of Electricity*, gave the results of his experiments in what is now known as electrolysis, and the following year witnessed the decomposition of the so-called fixed alkalies, and the discovery of the substances constituting their bases. In 1808 D. demonstrated that what Berthollet had supposed to be a compound of oxygen and muriatic acid was in reality a simple substance, which he called chlorine; and at the same time overthrew Lavoisier's theory of acids, which was in general acceptance among the chemists of that day. In 1814 he also discovered and experimented upon iodine, a substance resembling chlorine in many of its properties. D. was knighted in 1812, and received a baronetcy in 1818, while he was making his second tour on the Continent. In 1815 his attention was directed to the subject of mine explosions, and he was thus led to the invention of his Safety Lamp (q. v.), an invention which alone would entitle him to a high position among British men of science. In 1820 he succeeded Sir Joseph Banks as President of the Royal Society, but resigned in 1827, in consequence of failing health. A visit to Italy did not restore him; and he died at Geneva, May 29, 1829, his death being no doubt hastened by his early experiments on gases. His collected works (9 vols. 1839-40) were edited by his brother, Dr John D., who also published *Fragmentary Remains* (Lond. 1858). His last work was entitled *Consolations in Travel, or the Last Days of a Philosopher*. See *Life of Sir H. D.*, by J. A. Paris (2 vols. Lond. 1831).

Dawall'a (*Hypophthalmus dawalla*), a Teleostean fish belonging to the family of the *Siluridæ* or Sheat-Fishes. It occurs in the rivers of Guiana, and averages about two feet in length. The snout is elongated, and the teeth are numerous and of minute size. No scales exist. Its flesh is highly esteemed for its nutritious qualities and delicacy.

Dawk, or **Dâk**, literally the mail-post, but applied to an Indian mode of travelling in palanquins carried from station to

station by relays of men, usually consisting of eleven, the stations being from 9 to 11 miles apart. There are now Government post-waggons, or the horse-D., seated for four and serving as a bed for two.

Daw'ley Mag'na, a town in Shropshire, 3½ miles S.E. of Wellington, with blast-furnaces, bar-iron mills, collieries, lime and tile works. Pop. of town and parish (1871), 11,254.

Daw'lish, a village on the S. coast of Devonshire, and a station on the South Devon Railway. It was formerly an insignificant fishing hamlet, but from its beautiful situation in a valley between the mouths of the Teign and the Exe has now become a favourite watering-place. Pop. (1871) 3622.

Daw'son, John William, LL.D., naturalist, was born at Pictou, Nova Scotia, in October 1820. After studying for some years at Edinburgh University, he returned home, and has since wholly devoted himself to the study of natural science. He has greatly increased our knowledge of the palæontology of Canada, and is the discoverer of the oldest known form of organic life, the *Eozoon Canadense*, which belongs to the Laurentian formations. D. is Vice-Chancellor of the M'Gill University at Montreal, and a member of many scientific societies of Europe and America. Among his principal works are his *Archaia, or Studies of the Cosmogony and Natural History of the Hebrew Scriptures* (1858), his *Acadian Geology* (2d ed. 1868), and, most important of all, his *Devonian and Carboniferous Flora of Eastern N. America* (2 vols.), published by the Geological Survey of Canada. His latest works are *The Story of the Earth and Man* (1872), in which he combats Darwin's views on the origin of man, and his *Dawn of Life* (1875).

Dax (the *Aquæ Augustæ Tarbellicæ* of the Romans), a town in the department of Landes, France, on the left bank of the Adour, 20 miles N.E. of Bayonne, with manufactures of pottery and liqueurs, and a trade in wine, corn, timber, hams, honey, wax, &c. Its hot saline springs, with a temperature of 158° Fahr. at their source, are efficacious in rheumatic complaints. Pop. (1872) 7850. The name D., formerly *Acqs*, is a corruption of *Aquæ*.

Day (Old Eng. *dæg*, Ger. *Tag*, allied to Lat. *dies* and *divum*, from a Sansk. root, *div*, 'to shine'), commonly denotes the time during which the sun is above the horizon, being thus opposed to night; but the term is also applied, in astronomy, to one complete rotation of the earth, taken with reference to some celestial body. Thus the *sidereal D.* is the time which elapses between two successive culminations of the same star; and from the earliest historic period this interval of time has not appreciably altered. Its consistency recommends it to the astronomer, who divides it into twenty-four sidereal hours, and these again into minutes and seconds. The *solar D.* is similarly measured by means of the sun; but owing to the orbital motion of the earth giving rise to the apparent motion of the sun among the stars, it is longer than the sidereal D. This difference is never twice successively the same, a circumstance which arises from two causes, viz., the varying velocity of the earth in its orbit, and the obliquity of the ecliptic. The *civil* or *mean solar D.* is the solar D. which would be given by the earth moving with its *mean* velocity in a circular orbit and making 365.2425 revolutions in one Gregorian year. This mode makes the days all the same length, and the noon of the civil D. sometimes precedes, sometimes follows, the true solar noon. Most modern nations place the beginning and end of the D. at midnight—an arrangement somewhat inconvenient to the astronomer, whose observations thus frequently extend over a time embracing parts of two days.

Day, in law, is twenty-four hours, beginning at midnight. Most European nations reckon so. All the days of the week except Sunday, or fast-days appointed by Government, are called *lawful* days. No legal execution against person or property can be done except on a lawful D. But criminal warrants, or, in some circumstances, warrants for apprehending a debtor, may be granted and executed on any D. Under statutes, various acts and contracts are rendered illegal if done or entered into on Sunday. See LORD'S DAY ACTS, SABBATH, PUBLIC-HOUSES.

Day, Thomas, a pamphleteer and tale-writer, and a man of very whimsical character, was born in London, 22d June 1748; studied at Oxford, and afterwards entered the Middle Temple. He sympathised with the Americans in the war of independence, and was an advocate for the abolition of the slave trade and for parliamentary reform. But he is remembered now only for his *Sandford and Merton* (1783-89) and *History of Little Jack*. He died 28th September 1789. An interesting and amusing sketch of D.'s character and ludicrous mishaps in search of a model wife is to be found in the *Saturday Review* of May 13, 1876.

Day-Fly (*Ephemera*), a genus of insects belonging to the order *Neuroptera* (q. v.), and not to the order *Diptera*, or that including the common flies. See EPHEMERA.

Day-Lily (*Hemerocallis*), a genus of Liliaceous plants, of the species cultivated in our gardens. *H. flava* (of Hungary, France, Siberia, and China), and *H. fulva*, a native of the Levant and France, both fibrous-rooted perennials, produce abundant foliage which is eagerly eaten by cattle.

Day'lesford, a town in the colony of Victoria, 78 miles N.W. of Melbourne. It is the centre of an important gold-mining district; the form in which mining operations are now chiefly carried on being quartz-crushing. Pop. 5700; of the district, 19,000.

Days in Bank are, in England, certain days in term when writs are returnable, or when the party shall appear in court upon the writ served. They are so called in contradistinction to days at *Nisi Prius* when trial by jury took place.

Days of Grace are the three additional days formerly allowed by custom, and now by the law of the United Kingdom, for payment of a Bill of Exchange (q. v.) which has come to maturity. If the third day fall on a Sunday, the bill is payable the day before. If it fall on a bank holiday, it is payable the day after. The number of D. of G. allowed for payment of a bill in different countries varies.

Day'ton, a flourishing city in the S.W. of Ohio, at the confluence of the Mad and Great Miami rivers. Its streets are well laid out and adorned with many fine residences and public buildings; among others, the marble courthouse, after the Parthenon. It has flour, saw, oil, paper, and cotton mills, breweries, farming implements, and railroad cars. The prosperity of D. had its origin in the Miami Canal, connecting the city with Lake Erie (1829). Pop. (1870) 30,473.

Days'man, an umpire. The word occurs once in the authorised version of the Scriptures, in Job ix. 33—'Neither is there any D. betwixt us, that might lay his hand upon us both.' It occurs also in Spenser in a similar sense. The word so translated in Job comes from a root meaning 'to rebuke.' The origin of the English word is found in the old meaning of *Day*—the day, *i.e.*, of settling a cause judicially.

D'Aza'ra, Don Fe'lix, a Spanish naturalist and traveller, born at Barbunales, Aragon, 18th May 1746. After obtaining the rank of brigadier-general in the Spanish army, he was sent to S. America, as one of the commissioners to settle the boundaries of the Spanish and Portuguese possessions there. He remained in S. America for twenty years, devoting his leisure to the investigation of the natural history of the New World, and published, on his return to Europe, *Apuntamientos para la Historia Natural de los Pajaros del Paraguay y Rio de la Plata*, of which an English translation by W. Percival Hunter was published at Edinburgh in 1838. D'A. died in Aragon in 1811.—His brother, **Don Joseph Nicholas D'A.** (1731-1804), was a distinguished diplomatist.

Dea'con (Gr. *diakonos*, 'an attendant'), a certain kind of minister in the Christian Church. It is generally assumed that the institution of the office is described in Acts vi., and that the duties of it in the Apostolic Church were entirely connected with temporal affairs. According to another view, the seven whose appointment is described in Acts vi. were merely special commissioners to meet a special emergency, and a class of deacons or servants existed from the first in imitation of the constitution of the synagogue with its ministers (Luke iv. 20), or even as a necessity; which seems to be indicated by the 'young men' of Acts v. But the qualities of the D., almost equal to those required for a bishop described in 1 Tim. iii., indicate that he was more than a mere lay attendant. In the Post-Apostolic Church,

at any rate, deacons were regarded as ministers of the same kind as the presbyters and bishops, though of an inferior kind; they were not called priests, but ministers or Levites. Before the institution of the inferior orders—readers, exorcists, &c.—the D. performed all the duties afterwards distributed to these. His duties were—(1) To take care of the sacred utensils; (2) to receive the offerings of the people; (3) to distribute to the people the elements at the Eucharist, after these had been consecrated; (4) to direct the people in their devotions; (5) sometimes to read the Gospel, and baptize; (6) to preach when licensed by the bishop; (7) to be the bishop's almoner, secretary, and sometimes his representative, and generally to be his eyes, ears, and right hand. His dress was the alb and stole, then the colobium, and finally the dalmatic. In modern Episcopal churches the D. ranks as the lowest of the three sacred orders, and acts as the priest's assistant in divine service, but has no independent cure of souls.

Deaconess.—Whether or not the institution was as old as that of the deacons, there existed very soon in the primitive Church a class of female servants who performed all those offices towards the females of the congregation which the deacons did for the men. According to the primitive regulations, they had to be widows who had borne children, been once married, and sixty years of age; later they were allowed to be virgins, and only forty years old. The order gradually died out in the Western Church from the 5th c., but was retained in the Greek till the 12th. See Bingham's *Ecclesiastical Antiquities.*

Deacon of a Trade. The president for the time of certain corporations in Scotland is so called. Before the passing of the Burgh Reform Act, the deacons of the crafts were *ex officio* members of the town council in royal burghs, and represented the trades. But by the Act above mentioned it is provided that the D. shall no longer be a member of the town council in virtue of his office. The D.-Convener of the Trades in Edinburgh and Glasgow continues to be a constituent member of the town council. The D. is preses of the incorporation, and signs the record of its acts.

Dead, a word used in nautical phrases or names, and in general indicating fixedness or passivity; as *D.-eyes*—immovable blocks used for tightening rigging; *D.-lights*—wooden shutters used to replace glass windows in stormy weather, &c.

Dead, Judgment of the. In ancient Egypt the belief seems to have been that immediately after death the spirit of the departed was led by the goddess of truth, Ma, before Osiris, the judge of the dead. The form of trial is symbolised in the papyrus rolls found among the mummies. An ostrich feather, as a symbol of truth, is seen in one scale of a balance, and a vessel in form of a human heart in the other. Forty-two gods, each presiding over a special sin, appear as judges, while a female hippopotamus appears as prosecutor. The scales are watched by the gods Horus and Anubis, the result in each case being noted by Thoth-Hermes, the justifier. According to Diodorus there was a form of human trial. If the result of this was unfavourable, funeral rites were withheld.

Dead Freight. A merchant who freights a whole ship must pay the shipmaster for unoccupied space. This due is called the D. F. It is, strictly speaking, a sum owing as damage for loss of freight; therefore, the shipmaster has no lien over the goods on board in security of his claim, which can only be made effectual by a personal action against the freighter. But lien may be constituted by stipulation in the charter-party.

Dead'ly Night'shade. See BELLADONNA.

Dead Nettle (*Lamium*), a genus of Labiate plants. The white D. N. (*L. album*), the purple D. N. (*L. purpureum*), and *L. incisum*, are all common British wayside and hedge weeds. The two first are sometimes used as potherbs in Sweden. The name is also applied to the allied genera *Galeopsis* and *Galeobdolon*, some species of which (*G. tetrahit* and *G. versicolor*, or hemp-nettle) share with the D. N. proper the reputation of having stinging hairs, capable of causing great irritation, especially when the plant is drying, though they are as yet unknown to the botanist.

Dead Reckoning, in navigation, the calculation of a ship's position relatively to the point from which she started, by a series of consecutive observations of speed and direction independent of astronomical observations. See NAVIGATION.

Dead Sea, the *Lacus Asphaltites* of the Greeks, the *Salt Sea*, the *Sea of the Plain*, and the *East Sea* of Scripture, and the *Bahr Lût* ('Sea of Lot') of the Arabs, is situated in the S.W. of what was anciently Palestine, now comprised in the vilayet of Syria. The name D. S. first occurs in Justin (*Mare mortuum*) and Pausanius (*Thalassa nekra*). The greatest length of the lake is 46 miles, its greatest breadth 10, and its area 290 sq. miles. Soundings of about 250 fathoms have been taken in its northern part; but the southern half is shallow, one-fourth of its length not exceeding 3 fathoms. At its northern end it receives the Jordan, and small variable streams enter it on each of the other sides; but as it has no outlet, its surface being 1312 feet below the level of the Mediterranean (and therefore 'the most depressed sheet of water in the world'—Stanley), its superfluous waters are carried off by evaporation, which accounts in some measure for their excessive saltness. The average of nine experiments, made at different times by eminent chemists, shows a specific gravity of 1·1556, that of pure water being 1·000. The water is so saturated with salt that it can take up only one-eleventh of its own weight, while that of the Atlantic can take up one-sixth. The depression occupied by the D. S. is now proved to be a volcanic crevice, and in the northern part of the region volcanic formations are found in considerable number. It is believed to be the seat of those 'Cities of the Plain' that were consumed by fire; and in the middle ages credulous pilgrims believed that they could catch a glimpse of Sodom and Gomorrah through the depths of the penal waters. But the Scriptural narrative forbids us to believe that the catastrophe was caused by submersion. The geology of the district, no less than the names Sodom and Bela (Zoar), suggests an earthquake or a volcanic eruption. The limestone cliffs forming the sides of the depression exhibit a remarkable regularity of height throughout their course, the western side having an elevation of 1000 feet, and the eastern of 2000 Both are nearly destitute of vegetation, except where a spring bursts from the foot of the mountain, or where a perennial stream fills the rift in the precipice with acacias. The epithet *Dead* was applied to this sea from the belief that its atmosphere was inimical to life; but there is nothing unhealthy either in the lake or its shores beyond what naturally arises from the excessive heat of the climate; and the picturesque myths that once circulated among Christians have now disappeared from literature. See Stanley's *Sinai and Palestine* (Lond. 1866).

Dead's Part is, in Scotland, that part of a man's *movable* (personal) estate which he is entitled to dispose of by will. If he is survived by neither wife nor children, the whole movable estate is D. P. If he leave a widow and no children, one-half goes to the widow as *Jus Relictæ* (q. v.); if he leave a child or children, but no widow, one-half goes to the children as *Legitim* (q v.); and in either event the other half is D. P. If he leaves a widow and a child or children, the movable estate is equally divided into *jus relictæ, legitim*, and D. P. These legal divisions may be altered by marriage-contract, or by renunciations or discharges by the wife or children.

Deaf and Dumb, The, or, more correctly, **Deaf-Mutes** (Fr. *Sourds-muets*, Ger. *Taubstummen*), are those who suffer simultaneously from the want of the powers of speech and of hearing. A popular fallacy regarding this affliction is that it is twofold in its nature, implying malformation or incapacity in the speaking as well as in the hearing organs, whereas the power of articulation is undeveloped in the deaf-mute, or, in other words, he is dumb merely in consequence of his deafness. It will be observed that a perfect ear is necessary in acquiring the power of expression, since the primary means of so doing is by imitating the sounds we hear uttered by others. If a person, therefore, be unable to hear from infancy, it is impossible for him to learn the constituent elements of oral language; and if unaided, he must remain dumb even though possessed of the perfect organs of speech. Thus dumbness is the inseparable accompaniment of a congenital deafness. Also if a child lose the power of hearing before acquiring the faculty of speech, it inevitably incurs dumbness. But when the deafness is accidental, and occurs in an adult, it is not necessarily followed by a loss of utterance. The deaf man continues to speak as before; but even in such a case,

when the ear no longer performs its controlling function, if great attention be not paid by others to the regulating of his voice, it rapidly changes character; he speaks in a lower tone, accentuates his words badly, and eventually becomes all but unintelligible. Congenital deafness most often, perhaps, results directly from deficient action of the auditory nerve, and is generally incurable. That accruing from accident may be due to various causes; its curability depends on the nature of the cause, and the particular character and extent of the injury. See DEAFNESS.

The *statistics* bearing on the subject of deaf-dumbness, now comparatively full and authentic, do not reach further back than the year 1850. Since that year various commissions have inquired into the causes of deafness, the localisation of deaf-mutes, their social condition, education, &c. (See *Reports on the Status of Disease.*) Social science also has been directing attention to the possibility of reducing the extent of the evil by stricter conformity to hygienic discipline. It is impossible indeed to say what share the good done in this way may have had already in bringing about the favourable state of affairs to be noted in a comparison of the returns for 1851 with those for 1871. The total number of the deaf-dumb in Britain, according to the census of 1851, amounted to 17,300, or 1 in every 1590 of a population of 27,511,801. The following are the numbers as given in the census of April 3, 1871:—

	Males	Females.	Total
England, . .	6,262	5,256	11,518
Scotland, . .	1,432	652	2,088
Ireland, . .	3,461	2,093	5,554

In this year the population had increased to 31,845,379, while the actual number of deaf-mutes had declined, and the proportion had fallen to 1 in 1644. The total number of deaf-mutes in Europe is estimated (1875) at 200,000, of which Germany has 35,000, or 1 in every 1200 inhabitants; France 22,000, or 1 in 1640. Taking as an average 1 in every 1400 men, or 700 in every million, there is a grand total of 700,000 deaf-mutes in the world. Of these, the proportion of males to females is as 4 to 3, while only 3 out of every 10 have received instruction.

The distribution of deaf-mutes in England, as clearly shown by the returns, is not only disproportionate in the various districts, but is fixedly so, in a manner indicating a connection between the prevalence of deafness and the physical character of a country. And on a closer examination of the statistical evidence, it is at once seen that deafness is decidedly more common in mountain regions than in level districts, in rural parts than in cities and industrial centres. It would also appear that one of the commoner causes of its prevalence is the malaria arising from swamps or stagnant waters, or, indeed, any general impurity of the atmosphere. The elucidation of such facts as these is all-important, as showing that the evil is not altogether inevitable, and as pointing out a path for modern science and philanthropy.

The various institutions in Great Britain and Ireland for the education of the deaf and dumb, with the dates of their foundation and the number of their inmates, were as follows in 1871.—

ENGLAND AND WALES	
London, 1792, . . .	250
Hackney, 1851, . .	36
Margate Branch, 1862, . .	58
Birmingham, 1812, . .	108
Manchester, 1823, . . .	138
Liverpool, 1825, . . .	100
Exeter, 1827, ...	65
Doncaster, 1829, . . .	105
Newcastle, 1839, . . .	77
Brighton, 1841, . . .	97
Bristol, 1841, . . .	33
Bath, 1842, ...	20
Swansea, 1847, . . .	26
Llandaff, 1862, . . .	21

SCOTLAND	
Edinburgh, 1810, . . .	63
Donaldson's Hospital, 1815,	83
Glasgow, 1819, . . .	99
Aberdeen, 1819, . . .	26
Dundee, 1846, . . .	30

IRELAND.	
Dublin—	
Claremont, 1816, . . .	50
St Mary's, 1846, . . .	156
St Joseph's, 1846, . .	175
Belfast, 1831, ...	82
Strabane, 1846, . . .	15

Including the above, there are in all some 300 institutions throughout Europe. There are 100 in Germany, 48 in France, 30 in Italy, 20 in Austria, 12 in Switzerland, 10 in Belgium, 3 in the Netherlands, 4 in Denmark, Sweden, and Norway, 2 in Russia, 15 in the United States, and 1 in the Dominion of Canada.

The *education* of deaf-mutes is encompassed by inconceivable difficulties. Not only is the deaf-mute destitute of all ideas derived from or connected with sound, but he is deprived of the very means by which instruction is usually conveyed, and is entirely ignorant of the power of words. To him the speaking voice is a nonentity. He can only hold converse by means of a few imperfect natural signs. His knowledge is confined to what he may have seen; the conception of past ages, distant countries, of a future world, or of a Deity, are all beyond his grasp. In the education of such a one the teacher has to communicate the medium of a complete language, as well as the entire mass of ideas, to a mind in a state of utter infancy.

The methods employed in the education of deaf-mutes are principally three in number—as named by the French, *mimique, phonologique, graphique.* Of these, the first deals in signs, and consists of (1) dactylology, or the art of spelling with the fingers; and (2) mimology, or the language of gestures. The second method is distinguished by the employment of oral means of instruction; it is divided into (1) phonology, or 'artificial speech;' and (2) labiology, or 'reading on the lips.' The graphic method, which is not less important as an end than as a means, comprehends alphabetic writing and the notation of gestures. The advocates of the sign-system can point to its great practical success, and are supported by the fact that instructed deaf-mutes generally employ it when conversing among themselves The oral system is viewed by many as a higher form of tuition, inasmuch as it enables the deaf-mute to hold intercourse with society at large. Germany, the home of the latter system, is, however, almost the only country in which it extensively prevails, although it is also taught in a modified manner in a few of the schools of England and France.

The language of natural signs or gestures, the 'mother-tongue' of the uneducated deaf-mute, is an important auxiliary of the teacher. The deaf and dumb take evident delight in its use, and by its means they can give life and force to their ideas. Their only resource when unprovided with instruction, it is carried to a wonderful degree of expressiveness, capable of rapidly conveying question and answer, or even the sustained flow of ideas in a lengthy narrative. 'To this rude though powerful mode of intercourse, which all the deaf possess in a higher or lower degree, those who are intelligent add signs of description by which they are able to explain facts and circumstances that have been brought under their observation. The teacher takes advantage of this method of communication to add to their stores of knowledge, to enrich and extend the sphere of their thoughts. . . . Thus a conventional language is formed which assists in their intellectual culture.' But such intercourse leaves the pupil entirely ignorant of the structure of sentences, and therefore it must be made subsidiary where the object is to teach a syntactical language.

Dactylology, or the finger-language, is based on the 'manual alphabet,' and, in the words of Degérando, gives to material writing the movableness of speech. There is a one-handed and a two-handed alphabet; the latter is that in common use in England, the former on the Continent of Europe and in America. George Dalgarno (q. v.), a Scotchman, issued the first English alphabet in his *Didascolocophus* (1680). Either of those now employed may be learned by an hour's practice; they are often taught to the deaf and dumb, together with the written alphabet, in a few days.

The office of phonology is to give to the deaf-mute the power of articulating the language that he cannot hear. To impart this power is a task requiring the greatest patience, and a knowledge of the vocal organs. Only one pupil can be taught at a time. The teacher proceeds by slowly uttering the vowel and consonant sounds, carefully showing how the mouth and tongue are disposed, and, as progress is made, gradually rising to syllables, words, and short sentences. At first the pitch and intonation are faulty, the high sounds amounting to a scream, the low ones little better than a growl, while others are nasal or drawling. In a report on the subject, the Rev. George E. Day, of America, says, 'This process is correctly called by German writers *mechanical speaking*; much time must necessarily be devoted to it, and with the greatest efforts only a defective utterance can be reasonably expected.' It is certainly true that those who are born deaf rarely if ever acquire correctness or fluency.

Reading on the lips is the counterpart of phonology, as it enables the deaf-mutes to ascertain what is said by others. It is performed solely by the assistance of the eye, and is liable to certain restrictions, *e.g.*, that the deaf-mute be near the speaker, that there be plenty of light, &c. Dr Johnson, at the close of the *Journey to the Western Islands*, speaking of Braidwood's pupils, remarks that 'it is an expression scarcely figurative to say that they hear with the eye.' The manner of teaching to read on the lips is somewhat similar to that of training the deaf to

speak, and it may be said that the process is more successful as a rule. But the aptest pupil is unable to take part in a general conversation, or to follow a public speaker.

After all, it is of far greater importance that the deaf and dumb can be taught to read and write than that they should be able to speak or follow the conversation of others imperfectly. Reading alone will bring within their reach the hidden treasures of knowledge, while writing affords an accurate means of communication where finger-language fails.

The *history* of the educational treatment of the deaf and dumb is little else than a page from the record of modern philanthropy. Various nations of early times regarded the deaf as labouring under the curse of heaven. Aristotle declared that they could not participate in knowledge. The Roman code incapacitated those born deaf of making a will, and placed them under various other civil disabilities. St Augustine in the 4th c. excluded this class from the Church, interpreting in too literal a sense St Paul's *fides ex auditu*. We are told by Bede that a deaf man was taught to repeat words and sentences by St John of Beverley in 685. Eight centuries elapse before we read in the works of Rodolphus Agricola of Groningen of another deaf-mute who was taught to read and write. Fifty years later the versatile Professor of Pavia, Jerome Cardan (1501-76), founded the theory on which the education of the deaf and dumb rests, announcing that, as written characters and ideas may be connected together without the intervention of sounds, as in hieroglyphics, the instruction of the deaf is not impossible. Soon afterwards, Pedro de Ponce, a Benedictine at Oña (1520-84), gained a wide reputation for teaching deaf-mutes to speak and write. In 1620, Juan Paulo Bonet, a Spaniard like Ponce, and a monk of the same order, invented a one-handed alphabet. Henceforth the subject began gradually to receive more attention; various systems were tried and discarded, and fresh books continued to announce new theories. Among the more distinguished writers and workers in connection with the subject were Dr John Bulwer (1648), Dr William Holder (1669), Dr John Wallis (1670), and George Dalgarno (1680), in England; Van Helmont (1667), and Johann Konrad Amman, a Swiss physician (1690), in Holland; Karger (1710), Georg Raphel (1718), Arnoldi (1778-1841), and Samuel Heinicke (1729-90), in Germany; Rodrigue Pereire, a Portuguese (1715-80), the Abbé Deschamps (1779), the Abbé de l'Epée (1784), and the Abbé Sicard (1742-1822), in France. The earliest schools established were those of L'Epée at Paris (1760), and of Thomas Braidwood at Edinburgh (1760). These were followed by the foundation of similar institutions at Vienna, Berlin, Prague, &c. Heinicke, like Braidwood, was an able teacher of the articulation school. The management of the schools of Paris and Bordeaux was transferred to the state in 1791. See Dr Joseph Watson, *Instruction of the Deaf and Dumb* (Lond. 1820); Rev. George E. Day, *Report on the Various Systems in Europe*, &c. (1846); Picard, *Théorie des Signes pour l'Instruction des Sourds-muets* (Par. 1808, new ed. 1828); Bébian, *Manuel d'Enseignement Pratique des Sourd-muets* (Par. 1827); Dr Blanchet, *La Surdimutité* (1850); Reish, *Der erste Unterricht des Taubstummen* (Leips. 1834); and Heil, *Der Taubstumme und seine Bildung* (Hildburgh, 1865). The *Organ der Taubstummen und Blinden Anstalten* has been issued by Mathies since 1855.

Deaf and Dumb, Law Regarding. By the Roman law, those born deaf were held incapable of entering into a contract. In England and in Scotland their legal capacity (see CAPACITY, LEGAL) is a question of fact which will be determined, if necessary, by a jury. By the law of England, a child born deaf and blind is regarded as an idiot. But it is not to be supposed that the law would continue to hold this view if the child was capable of education and received it. For a complete account of the legislation relative to the deaf and dumb from the earliest times down to 1824, with a list of authors, see the work, in Latin, of C. Guyot of Gronigen.

Deaf'ness can only be understood by careful study of the anatomy of the ear and of the complicated organs of hearing. It is very common, and may exist at any age. It is sometimes congenital—often results from fevers, especially measles, scarlet fever, &c., and is generally present to a greater or less degree in the aged. All degrees of D. occur, from the slightest impairment of the sense of hearing to complete insensibility to the vibrations of sound. Speaking generally, it may be caused by anything which interferes with the consciousness of the impression of sounds, by some obstruction in the auditory passages, by disease of the organs of hearing, or of the brain, rendering the person unconscious to the impression produced on the Auditory Nerve (q. v.). A common cause is some obstruction in the *external* ear, as any foreign body, introduced by accident or otherwise, interfering with the passage of the air to the *membrana tympani*. A still more frequent cause is a Polypus (q. v.) growing in the external ear. But the most frequent cause of all is accumulation of wax (*cerumen*). This is fortunately one which is easily removed, by syringing the ear with tepid water. In some cases, it is desirable to previously soften the wax with almond oil or an alkaline lotion. Inflammation of the membrane of the ear, or *drum* as it is popularly called, is another cause of D., especially when the inflammation ends in ulceration and perforation of the membrane. Such inflammation is to be treated by appropriate remedies; and when there is rupture of the membrane from this or any other cause, a simple but very effective remedy is to introduce daily a small piece of cotton wadding, or to use an artificial *membrana tympani*. This artificial membrane consists of a thin piece of caoutchouc, round which is attached a small silver wire. In either case the ear requires to be washed out daily and the substance reintroduced. Not unfrequently the cause of D. is some defect in the tympanum or middle ear. This cavity is normally filled with air through the Eustachian Tube (q. v.), and during each act of swallowing air enters into the middle ear, so that when this tube is obstructed by inflammation, the sense of hearing is greatly destroyed. Disease of the bones of the middle ear, or impairment of their mobility, due to rheumatism or gout, sometimes causes D. The obstruction in the Eustachian tube may be removed by passing the Eustachian catheter, or by other appropriate means. Again, D. may result from disease of the *internal* ear, inflammation spreading to it from the middle ear. The term *nervous D.* is applied to all obscure forms of D. It ought to be limited to that kind of D. due to an affection of the auditory nerve or disease of the brain. Probably in old age the nerve of hearing becomes incapable of transmitting to the brain impressions produced by sound—a paralysis of the nerve not unlike that condition of the optic nerve causing that kind of blindness called amaurosis. This kind of D. is incurable. More frequently, however, it is due to functional disorder of the nerve caused by a blow, a fall, by a loud noise, by a medicine, or by congestion of the brain.

Dè'ak, Francis, the constitutional liberator of Hungary, was born of a noble Magyar family, at Kehida, in Szalad, October 17, 1803. He studied at Komorn and Raab, and after gaining some reputation as a barrister, became a member of the National Diet in 1832. In breaking down the exclusive privileges of the Magyar aristocracy, and in opposing the extension of imperial absolutism to Hungary, he first attained distinction as a sagacious and patriotic statesman. As Minister of Justice in the liberal Batthyanyi ministry, he strove vainly to avert the revolutionary war of 1848. While the conflict raged, and the Empire seemed crumbling to pieces, he held aloof, siding as little with Kossuth's republican violence as with the Austrian Government and its Slavic malcontents. On the suppression of the Hungarian insurrection D. withdrew into private life, and did not return till the Franco-Italian war extorted concessions from the fears of Austria. Solferino and the loss of Lombardy are traceable to the just disaffection of Hungary. Following on the peace came (1860) the offer, through the Schmerling Ministry, of a constitution common to the whole monarchy. But for five years this was unflinchingly resisted by D., now representative of Pesth, and leader of the Moderate party. His claims were the constitution of 1848, a Hungarian ministry responsible to the National Diet alone, the release of the revolutionary exiles, and the restitution of their property. After the further lesson of Sadowa (1866), and acting on the advice of Baron von Beust, Franz Joseph at last granted the whole of these demands. The ancient independence of his country was recognised, and D. asked no more. The last ten years of his life were spent in loyal service to that Austro-Hungarian monarchy which in no small measure owes to him its harmonious prosperity and strength. D. died January 28, 1876. His obsequies were attended by the legislature, by representatives of the Emperor, and by all ranks and sections of his countrymen. His chief characteristics were

honesty of purpose, sagacity, and strength of will, rather than the more brilliant qualities of the diplomatist and orator. But above all, he was inspired by a love of justice and of his country.

Deal (the 'valley,' a form of *Dale*), a municipal borough, seaport, and watering-place in Kent, 8 miles N.N.E. of Dover, on the coast between the N. and S. Forelands, and consisting of Upper and Lower D. The inhabitants are mainly occupied in boatbuilding, for which D. is famous, sailmaking, piloting, and victualling. D. is one of the Cinque Ports, and the official residence of the Warden of the Cinque Ports is Walmer Castle, a mile to the S., which, with D. Castle, built by Henry VIII. in 1539, and Sandown Castle, at the N. end of the town, defends the neighbouring coast. D. unites with Sandwich and Walmer in returning two members to Parliament. Pop. (1871) 8009.

Deal'fish (*Trachypterus*), the name of a genus of Teleostean fishes included in the family *Trachypteridæ*, and distinguished by an elongated body destitute of scales and of compressed form, by a single long dorsal fin, by the absence of an anal fin, and by the tail-fin not being in a line with the axis of the body, but rising vertically. Large ventral fins exist. The body is so compressed that a specimen three feet long may not exceed a paper knife in thickness. The colour is silvery-white. Six feet is not an uncommon length of these fishes. The best-known species is the Vaagmär (*Trachypterus arcticus*) of the Northern Seas.

Deals (Old Eng. *dælas*, 'parts,' from *dælan*, to 'deal' or 'divide'), a term properly applied to the thicknesses to which any piece of timber is cut up, but now generally restricted to pine wood, and to the particular sizes in which it is imported from Baltic ports. The size of such D. is 3 inches thick and 9 inches wide. They are sold by the 'hundred,' in which there are 120 pieces.

Dean and Chapter are, in England, the council of the bishop to advise him in religious matters. The chapters, consisting of canons or prebendaries, are sometimes appointed by the sovereign, sometimes by the bishop, and sometimes elected by each other. Deaneries and prebends may become void, like a bishopric, by death, deprivation, or resignation.

Dean Forest comprises 22,000 acres, between the Severn and the Wye, Gloucestershire. It belongs to the crown, and about the half of it is enclosed for the growth of navy timber. It is divided into six walks. The inhabitants, who had formerly many privileges, and have still the liberty of pasturage and fuel, and the right of mining—a sixth of the produce being reserved for the crown—are chiefly miners. D. F. is governed by a lord-warden, six deputies, four verderers, a conservator, and chief forester, offices vested by inheritance in the Wyndham family.

Dean of Faculty. The corporation of advocates or barristers in Edinburgh is called the *Faculty of Advocates*, and the D. of F. is elected annually to preside at their meetings and to sign their acts. Usually the dean is re-elected till he is promoted to the bench. See ADVOCATE.

Dean of Guild, in Scotch burghs, was originally the head of the guild brethren or merchant company. He was also a judge in mercantile and marine causes within the burgh. His duty is now limited to the care of buildings. He must see that they are sufficient, and that they are erected according to law. His judgments are liable to review by the Court of Session. In Edinburgh the D. of G. court consists of the dean and the former dean, and a council of merchants and tradesmen annually chosen. No building can be erected, taken down, or materially altered, without sanction of this court, which has also jurisdiction in regulating weights and measures.

Deans of the Chapel Royal. The chapel royal in Scotland was a collegiate church founded by the Scottish kings for their own use, the superior of which was called Dean of the Chapel Royal. This benefice was after the Reformation conferred first on the Bishop of Galloway, and afterwards annexed to the See of Dunblane. On the abolition of Episcopacy in 1690, the revenues fell to the crown, the sovereign bestowing them on one or more of the clergymen of the Church of Scotland, who are called *deans* and *chaplains*, and hold the appointment at the royal pleasure. In accordance with the recommendation of the Universities Commission (1858), the revenues have been divided into six parts, attached respectively to the chairs of Divinity and Biblical Criticism in the Universities of Edinburgh, Glasgow, Aberdeen, and St Andrews.

Death (Ger. *tod*, allied to Gr. *thanatos*). The body is composed of various tissues and organs, each of which acts to a certain extent independently of the others. In the performance of its functions, each tissue undergoes a certain waste of material, and each organ undergoes a certain loss by the D. of its component tissues. Each tissue may also be said to have a life of a certain definite duration. It is developed, grows, reaches maturity, declines, and dies. It is evident, therefore, that we may have two forms of D.—(1) *Molecular*, or the D. of individual tissues; and (2) *somatic*, or the D. of the whole body. Molecular D. is the consequence of the stoppage of that interplay between the tissue and the fluid pabulum, the blood, containing not only nutritious matter, but also oxygen, without which the maintenance of life is impossible. This form of D. is continually taking place in the body, and, unless it affects a large portion of the fabric, it does not interfere with the general life of the body, or what may be termed the *somatic* life. At some period or other, however, somatic or general D. takes place from the failure of action of some important organ or organs. Thus *somatic* D. will follow stoppage of the heart's action; but the tissues live for some time afterwards, and *molecular* D. slowly supervenes. The various forms of somatic D. are as follows—

(1) *Syncope*, or failure in the propulsive power of the heart. This occurs, for example, in D. by fainting. The individual becomes suddenly pale, drops down, and expires.

(2) *Asthenia*, or slow failure of the heart's action from deterioration of its tissue by fatty degeneration, or from deficiency of blood, as after excessive hæmorrhage.

(3) *Asphyxia*, or D. resulting from some obstruction to the aeration of venous blood in the lungs. This may be caused in many ways. For example, occlusion of the air passages, pressure on the chest so great as to prevent its expansion, puncture of the pleural cavities, or the breathing of irrespirable gases. In asphyxia venous blood is sent to the brain, and so affects its functions that unconsciousness speedily ensues.

(4) *Coma*, or D. resulting from interference with the functions of the brain. Pressure on the brain, or the circulation through its capillaries of certain poisons, such as alcohol, may cause D. by coma.

(5) *Necræmia*, or D. of the blood, as happens occasionally in malignant fevers.

Thus D. may commence at the heart (sudden, syncope; gradual, asthenia); at the lungs (asphyxia); at the brain (coma); or in the blood (necræmia).

D. may sometimes be simulated, as in 'trance' or 'catalepsy,' where we find all the functions of the body so feebly performed as to be scarcely perceptible. The surest test by which to distinguish real from apparent D. is the condition of the muscular system. After real D., muscle gradually loses its irritability, so that it does not contract when excited by electrical or other stimulation. Loss of irritability is followed by cadaveric Rigidity (q. v.), and this in turn is followed by putrefactive changes. So long as a muscle remains irritable it is not dead; loss of irritability and stiffening is a sure indication that D. has taken place.

Death, Legal. See CIVIL DEATH.

Death, Punishment of. See CAPITAL PUNISHMENT.

Death-Bed, Law of (in Scotland). By this law, which is peculiar to Scotland, the heir of heritage is entitled to reduce any deed by which he is injured, if granted by his predecessor within sixty days of D., provided he was suffering from the disease of which he died at the date of the deed, and did not subsequently go unsupported to kirk or market. If the maker of the deed be, at its date, suffering from one disease, and die of another or by accident, the deed is not reducible. In counting the sixty days, the day of signing the deed is not reckoned; but it is sufficient that the granter has survived until the running of any part of the sixtieth day. See COMPUTATION OF TIME.

Death's-Head Moth (*Acherontia Atropos*), a species of moth belonging to the family *Sphingidæ* or Hawk-Moths, and distinguished as a genus by the non-angulated sharp wings, by the short proboscis, and by the antennæ or feelers being hooked at

their tips. The hinder wings are small. The popular name of the moth is derived from a whitish patch on the back of the thorax, resembling exactly a human skull and collar-bone. The front wings are blackish-brown above, with stripes and markings of black and red colour at the edges. The hinder wings are yellowish, with two bluish-grey bands. The chest is blackish-brown, with the skull-like marking. The caterpillar of this moth, which may attain a length of five inches, is yellow, with a tuberculated body, and is marked on its sides with seven oblique bands of a green colour. The back is spotted black and blue, and the tail bears a prominent horn-like process. The moth, which is found in almost every part of the Old World, attains an expanse of wing measuring five or six inches. It makes a grating noise, probably by grating the abdomen against the chest, and has long been dreaded by the ignorant and superstitious.

Deaths, Registration of. See REGISTRATION.

Death-Watch (*Anobium*), the name popularly given to certain insects belonging to the *Coleoptera* or Beetles, and to the family *Ptinidæ* (section *Pentamera*) of that order, from their producing a rapping sound by knocking their heads against wood-work. This sound, dreaded by the superstitious, is the signal of one insect to its neighbour. The *Anobium striatum* and *A. tesselatum* are familiar species, and are also termed Borers (q. v.) from their habit of infesting wood. The *A. tesselatum* attains an average length of a quarter of an inch, and is of a dull grey colour. Its rapping is heard most frequently towards the end of spring.

Débâc'le (Fr. 'a breaking up') is used in France to denote the breaking up of the ice in a river or harbour, and by English geologists to denote the sudden irruption of a flood which leaves its path strewn with promiscuous debris.

Deba'table Land. A tract of country on the border of England and Scotland was so called, from having formerly been the subject of contention between England and Scotland. In 1542 commissioners, appointed by the two crowns, divided it by a line drawn between the rivers Esk and Sark, the northern division being given to Scotland and the eastern to England. It continued for long to be the haunt of freebooters.

De Be'ne Ess'e, a term of English law, signifying the admission that something done may be allowed to stand for the present; but that it must ultimately stand or fall by the result of future examination.

Deben'ture (lit. 'the acknowledgment of a *debt*,' from *debēre*, 'to owe'). A written instrument charging Government with payment of a specified sum is so called. A *Customhouse D.* is a certificate authorising an exporter of excisable goods to receive a Drawback (q. v.) equal in value to the excise duties which have been paid on them. To forge a customhouse D. is felony. A *Railway D.* is a deed of mortgage given by a railway for borrowed money. The D. is preferable, both as regards payment of the interest as it falls due and as regards repayment of the principal sum at the stipulated date, to any claim on account of any kind of shares. Railway debentures are usually, therefore, a safe and legal investment for trust funds. They are transferable without trouble or expense, the original expense, including brokerage, being paid by the company. Interest warrants or Coupons (q. v.) are attached to the deed. The usual rate of interest on a railway D. is 4 per cent. in England.

Deb'itor Non Præsu'mitur Dona're, a legal maxim signifying that a debtor is not presumed to make *a gift* to his creditor. Thus, when a debtor gives money to his creditor without assigning any reason for so doing, it is presumed to be in payment of the debt; but this presumption may be overcome by proof to the contrary.

Deb'itum Fun'di is in Scotch law a debt attached to land, and having a *lien* over it. A *Feu-Duty* (q. v.) and arrears of feu-duty are *debita fundi*. Rents, tithes (*teinds*), and similar burdens, though dues connected with land, are not *debita fundi*. Debts constituted by this title may be made effectual by Poinding of the Ground (q. v.).

Déblai' (Fr. 'excavation,' from *déblayer*, 'to clear away,' originally corn from a field, but afterwards earth), in fortification, denotes the earth dug from the ditch to form the parapet. The *remblai*, again, is the earth and other materials used in constructing the rampart and parapet.

Deb'orah (Heb. 'a bee'), a prophetess who judged Israel (Judges iv. v), and under whose direction Barak (q. v.) delivered the northern tribes from the oppression of Jabin, King of Hazor. She accompanied to battle the ill-armed band Barak had collected, and her exalted enthusiasm was the means of their gaining a great victory over the Canaanite host. The pæan which she and Barak sing together quivers at once with grateful devotion and vengeful glee. It is a miracle of Eastern poesy and passion.

Debou'ching (Fr. *déboucher*, 'to pass out,' from *bouche*, 'the mouth'), in military language, is to march out from a wood, defile, or other confined position.

Deb'reczin, the capital of the comitat of Bihar, and, next to Pesth, the chief trading town in Hungary, 120 miles E. of Pesth by railway. The streets, though broad, are filthy, and stately public edifices contrast oddly with surrounding hovels. There are several churches and a fine cathedral. The Reformed College has a library of 20,000 volumes, twenty-four professors, and 2000 students. The Honvéds who fell at the battle of D. in 1849 are commemorated by a monument, and a statue was erected in 1871 to the poet Csokonaij. D. is the seat of a Roman Catholic and of a Greek bishop. The chief manufactures are coarse woollens, leather, soap, tobacco-pipes, earthenware, and articles of cooperage. There is a large trade in horses, cattle, bacon, wine, corn, oils, ewe-milk cheese, tobacco, water-melons &c. D. has four annual fairs and the largest swine-market in Hungary. Pop. (1869) 46,111, of whom two-thirds are Magyars, and the greater number are Protestants. D. was the seat of Kossuth's Government in 1849.

Debruised', in heraldry, an animal or any other charge bruised out or debarred by a bar or any other ordinary. An ordinary may debruise an ordinary.

Debt. In English law, debts are classified as *specialty* debts and *simple* debts. The former are constituted by deed, or by a record or judgment of court, or by a Recognisance (q. v.). The latter are those arising without intervention of deed or of judgment. D. constituted by deed bears interest from its date. D. under judgment bears interest from date of judgment at 4 per cent.; it is effectual against land which a defendant may possess, and, if duly registered, it is effectual against a purchaser. The registration must be renewed every five years. Simple D. bears no interest. In Scotland, the main division of D. is into *heritable* and *movable*. Regarding the former, see article BOND.

Movable Debt is in Scotland *liquidated* (Scot. 'liquid'), *contingent*, or *future*. The first is D. constituted against the debtor by written obligation or by decree of a court; the second is D. depending on an event which may or may not happen (see CONTINGENT DEBTS); the third is when the liability is certain, but when the time for payment has not arrived.

Debt, Action of. In England, this is the proper form of action for recovery of a debt, when the amount of it has been ascertained by judgment of court or under a bond. It may in some cases be followed in debt otherwise constituted.

Debt, National. The N. D. of England at the Revolution of 1688 was £664,000. It was chiefly in the form of terminable annuities, specially charged upon certain branches of the revenue. The system of borrowing on annuities for terms of years and lives was continued by Government, until the magnitude of the debt rendered the method no longer practicable. At the Peace of Ryswick in 1697, the N. D. was found to be nearly £15,000,000, and the revenue was deficient £5,000,000. At this time, from the irregularity with which the interest on the floating debt was paid, Exchequer orders were at 40 per cent. discount. On the death of Queen Anne in 1714, the debt had increased to £36,175,460, bearing an annual charge for interest and annuities of £3,063,135. On 31st December 1748, after the treaty of Aix-la-Chapelle, it was nearly £76,000,000. During the short interval of peace which followed, Government was enabled, on 29th November 1749, by the rise in the price of stocks, to reduce the interest on the 4 per cents. to 3 per cent. In 1751 various stocks were consolidated into one fund. This was the origin of the present consolidated 3 per cent. annuities, or *consols*. The Seven Years' War, beginning in 1756, added to the debt £52,219,912; and by the end of the American war,

the total was £231,843,631. At the Peace of Amiens in 1802, it was £537,653,008; and at the Peace of Paris in 1815, it had reached the enormous total of £861,039,049.

The debt and annual charge for interest, per head of the population, were respectively in 1820 £39¼ and £1, 8s. In 1864 these figures had decreased to £26¼ and 17s. 7d.

For the financial year ending 31st March 1874, the public debt of the United Kingdom was as follows:—Capital of unredeemed funded debt, £723,514,005; estimated capital of terminable annuities, £51,289,640; total, £774,803,645; and the unfunded debt was £4,479,600—total of the N. D. at 31st March 1874, £779,283,245. The difference between 'funded debt' and 'unfunded debt' is that the state does not undertake to pay the former. In place of repayment they give a perpetual or terminable annuity; nevertheless the name of the creditor is entered in the books of the Bank of England as holding so much Government stock. This stock is transferable by entry in the books of the Bank.

British Government stocks are as follows:—*Three per Cent. Consols.* (See above.) *Debt due to the Bank of England*, £11,015,100. (See BANKS, BANKING.) *New 3 per Cent. Annuities.* This stock originated in 1830 by the conversion of the new 4 per cents. which had been formed in 1822 from the navy 5 per cents. *New 5 per Cent. Annuities* originated at the same date and in the same way. *New 3½ per Cent. Annuities* were created in 1853, as were also *New 2½ per Cent. Annuities*, the *Irish Funds*, *Savings' Bank Annuities.* By Act of 1864, £24,000,000 of 3 per cent. stock, standing in the names of the Commissioners for the reduction of the N. D. in the books of the Bank of England, is ordered to be cancelled, and in place of it is created a perpetual charge on the Consolidated Fund (q. v.). *Annuities of Terms of Years*, created under 59 Geo. III. c. 34. *Annuities Terminable in* 1885; these were created 16th April 1855, and expire April 5, 1885. *Red Sea Telegraph Company's Annuity* of £36,000 was created by 25 and 26 Vict. c. 39, and expires 4th August 1908. *Life Annuities* under various Acts. In 1829 Mr Finlaison, the Government actuary, found that the tables which had been used in calculating these annuities caused an annual loss to the public of about £100,000, owing to the improved value of human life. The consequence was the introduction of the tables now in use. See *Fenn on the Funds*, a new edition of which valuable work is issued every two years.

Formerly Exchequer bills were the only form of unfunded debt. They were first used as currency to supply the want of metallic money during the great re-coinage of 1695. Another kind of unfunded debt, called *Exchequer bonds*, was introduced by Mr Gladstone in his scheme for commuting some of the public stocks in 1853. The Exchequer bonds, to the value of £6,000,000, issued during the Russian war (1855–56), as well as those issued since, are of a different character; having been made absolutely payable at par, at fixed periods varying from three to six years. These have been properly treated as unfunded debt. Since the creation of the 3 per cent. consols, their lowest price has been in 1799, when they fell to £52, 5s. 8d. In 1844, 1845, 1852, and 1853 they rose above par; the highest price, £102, having been in 1852.

For long the N. D. of the United Kingdom was the largest in the world. It is now somewhat exceeded by that of France. The debt of the United States of America is now about 450 millions sterling; but in France and in the United States, the rate of interest payable to the fundholders being considerably higher than in England, the pressure of debt is greater relatively to its magnitude than it is with us. The debt of Italy is nearly 400 millions; that of Austria and Hungary, about 350 millions. Spain owes over 260 millions. Turkey 200 millions; Russia, about 140 millions; Holland, about 70 millions; the German Empire about 70 millions. Some regard the N. D. of England as a huge financial incubus, which ought to be got rid of at any cost of extra-taxation or reduction of expenditure; others, again, regard it as a national blessing, in so far as it is a safe means of investing trust funds. It would unquestionably have been better that the debt had never been incurred—that is, that state expenditure had always been fully met by revenue. But the debt represents the bygone fact of so much waste of human labour; and this fact can never be undone. In spite of the immensely greater debt, the country is immeasurably richer than it was two centuries ago; but it would have been so much richer still had it not spent so many hundred millions in fighting. Yet the one aim of a country ought not to be the accumulation of wealth. If our forefathers have bequeathed to us a huge debt, from them we inherit the British Empire, laws, and institutions, by whose means we have created a commerce and wealth never before known in the world.

The plan of paying the debt by a *Sinking Fund* (q. v.) is transparently fallacious. The expediency of paying it by extra-taxation depends on the moral nature of the people. In so far as the extra-taxation would be met by extra-economy, there would be gain, but no further than this.

Debt'or and Cred'itor, Laws of. With the progress of civilisation the power which law gives to the C. over the D. diminishes. In the earlier stages of society, the view which the law takes of the relationship between a man and his family is that the latter is merely a part of the property of the former. Even in ancient Rome a father had power of life and death over his children. He could sell or resign them, instead of paying damages incurred through their fault. The acquisitions of a son were called Peculium (q. v.), the term applied to the portion of a slave. Hence it logically followed that the law which gave a C. power over the person of his D. gave him power over the D.'s family, the family being regarded as merely property. According to the law of Moses, a poor man might be sold to a rich one, and compelled to serve him as 'an hired servant' (Lev. xxv. 39).

With the progress of civilisation and commerce, these laws gradually relax, until in the final stage it is seen that a C. ought to have no direct power over the person of his D., and that this power ought to be vested in a judge. In commercial failures it is found that the fault is often with the creditors themselves quite as much as with their D. With regard to changes which have recently taken place in England in the L. of D. and C., see DEBTS, RECOVERY OF. See also STAPLE.

Debtors Abscon'ding. (See DEBTS, RECOVERY OF.) Absconding shareholders, or shareholders intending flight, may be arrested, or their effects seized, under the provisions of the Joint-Stock Companies' Act. Debtors in Scotland intending to abscond may be dealt with under a warrant of *Meditatio Fugæ* (q. v.).

Debtors, Impris'onment of. (See DEBTS, RECOVERY OF.) In Scotland, a debtor to the value of £8, 6s. 8d. may still be imprisoned. (See CAPTION, DILIGENCE.) The first step is for the Messenger-at-Arms (q. v.) to touch the shoulder of the debtor with his wand, and to tell him that he is a prisoner. After this, should the debtor escape, even to the sanctuary of Holyrood, the messenger may follow and convey him to prison. The amount of the debt is entered in the jail-books, and should the prisoner escape, the magistrates are liable for the debt. A messenger must not take payment of a debt unless instructed to do so; his business being to execute personal diligence.

Debts, Recov'ery of. The rule of law which allows only *taxed costs* to a successful litigant, leaving him to pay the difference between them and the law charges of his legal adviser, may be on the whole the best rule which can be adopted; but its operation often results in great hardship in the case of a person suing for a debt of moderate amount. He may gain his case *with costs* (Scot. law, *expenses*), and yet find the value of the subject of litigation greatly exceeded by his own share of the expense. And if his opponent who has lost is ruined by the result, he must pay even the costs which the law has awarded to him. In such questions the aim of the law should be simplicity and quickness of operation; because it is better that there should be a *chance* of some injustice being done in ascertaining on whose side the right is, than that injustice should *certainly* be done in making the party on whose side the right is pay more than the right is worth in order to make it effectual.

By 1 and 2 Vict. cap. 110, the power to arrest in Mesne Process (q. v.) was abolished. The Act 7 and 8 Vict. cap. 96, abolishes arrest on *final process*, and prohibits imprisonment upon any judgment obtained in any court where the debt recovered did not exceed £20, exclusive of costs.

These two Acts being found somewhat unfair in their operation towards certain classes of creditors, especially towards retail tradesmen, an improvement was attempted in the session following the passing of the last Act referred to. By 8 and 9 Vict. c. 127, it is provided that any creditor obtaining a judgment or order

from any court of competent jurisdiction in England, in respect of a debt *not exceeding* £20, besides costs of suit, may obtain a summons against his debtor from any commissioner of bankruptcy, or from any inferior court for the recovery of small debts having jurisdiction in the district in which the debtor resides. After procedure, if the court find for the plaintiff, it will order payment of the debt in instalments, or otherwise; and the court may, in case of fraud or contumacy, commit the debtor to prison. The Act of 1869 abolishes imprisonment for debt, except in certain cases, but it does not affect the power of the court to commit a debtor to prison as above noted; this power being not to imprison for the debt, but for fraud or contumacy; and the imprisonment is at the instance of the court, not of the creditor. The Act of 1869 makes many other important provisions in the relationship of debtor and creditor. Any debt not exceeding £50 may be sued for in the county courts of England. If a plaintiff bring his action before a superior court for a debt not exceeding £20, or not exceeding £5 in an action of Tort (q. v.), he will have no costs awarded, unless by special order or certificate of the court. See COUNTY COURTS.

In Scotland, debts not exceeding £12 may be sued for in the sheriff's small-debt court. If a creditor or debtor appear by agent, it must either be by consent of parties, or by permission of the sheriff. No record of evidence is taken, and the whole procedure is rapid—we might say, often hasty and superficial. Doubtless it is better to have a question of £10 or £12 so disposed of—the expense of which, even to the loser, does not exceed a few shillings—than to have the value of the original question wholly merged by the first legal step in the question of expenses, as would surely be were the case entangled in a lawsuit before the superior courts. But might not there be a legal tribunal by which, in a small matter as well as in a great one, evidence could be exhaustively gone into and weighed with deliberation, without the intervention of a country agent, a town agent, and counsel—and without the enormous, and usually disproportionate, expense of so complex, and, as it seems to us, unnecessary machinery?

The Debts Recovery Act of 1867 has made many important alterations in the law of Scotland regarding R. of D. Debts between £12 and £50, which would prescribe if not sued for in three years (see PRESCRIPTION), may now be sued for before the sheriff's small-debt court. In actions of this class, agents are allowed to appear. If the debt does not exceed £25 there is an appeal from the sheriff-substitute to the sheriff; and if the debt exceed £25 an appeal may be made to the Court of Session. Where the debt does not exceed £12, there is no appeal from the judgment of the small-debt court.

Debts, Recovery of, Abroad.—It is a very common error that French tribunals take no cognisance of suits between persons who are not subjects of France, and that a debtor may consequently reside in France in defiance of his creditor. The rule of French law is, that no foreigner can prosecute another before a French tribunal unless there has been a decree or judgment of a court of their own country in favour of the claimant; but on proof of such decree or judgment, a French court will give effect to it; and it is believed that the same rule of law holds in Belgium. But it is very difficult in either of these countries to enforce payment of a debt against a creditor who has escaped from his own country before procedure has been taken against him.

Débu't (Fr. *début*, 'the first throw at play'), a French word adopted into English, denoting the first appearance of an actor, public speaker, or any individual whose influence depends on personal presence. It is almost exclusively applied to appearance on the stage, the words *débutant* and *débutante*, for actor and actress making a D., having also been introduced into English.

Deca'dence (Fr. from Lat. *de* and *cadere*, 'to fall away'), a period in which the art literature of a nation, after a brilliant maturity, begins to wane, is called a time of D. Thus Greek sculpture after the age of Pericles, Latin literature after the age of Augustus, and Italian painting from the 17th c. downwards, are said to belong to the Greek, Latin, and Italian decadences. In French literature, the years from 1770 to 1800, or, according to some, till the Romantic movement of 1830, are called the French D. A period of D. is generally marked in literature by an overstrained and over-coloured style, as in the late Latin poets, and in art by complicated refinements, as in the Byzantine school. Individual works belonging to a D. are not necessarily inferior to those of earlier times.

Dec'agon, a geometrical figure with ten sides and ten angles. A regular D. has all its sides and angles equal, and is inscribable in a circle. If r be the radius of the circle, the side s of the D. is $s = \frac{1}{2} r(\sqrt{5} - 1)$.

Decais'nea, a genus of plants of the natural order *Lardizabalaceæ*, named in honour of the French botanist M. Decaisne. There is only one species (*D. insignis*), found in the Himalayas at the height of from 6000 to 10,000 feet. Its fruit is sweet and wholesome, and eaten by the Lepchas and other Himalayan tribes.

Dec'alogue (Gr. 'the ten words') is the name given by the Greek fathers to the law of the two tables received by Moses from the hand of God on Mount Sinai. The commandments have been variously divided and distributed to the two tables. 1. In the catechisms of the Greek, Anglican, and all the Reformed Churches (except the Lutheran), following Origen, ver. 2 of Exod. xx. is made merely a preface; the first commandment is ver. 3; the second, 4-6; the third, 7; the fourth, 8-11; the fifth, 12; the sixth, 13; the seventh, 14; the eighth, 15; the ninth, 16; and the tenth, 17. 2. According to the Talmud and the modern Jews, Exod. xx. 2 is the first commandment; the second is 3-6, and the rest as above. 3. The Masoretic division, which is that followed in the Lutheran and Trent catechisms, makes ver. 3-6 the first commandment, and then divides the last into two; so that the ninth is 'Thou shalt not covet thy neighbour's house' (otherwise 'wife,' which is first in Deut. v. 21); and the tenth, the rest. As to what belonged to each table, Philo gave five to each; the opinion in the Greek and Reformed Churches is that the one contained the first four, or our duty to God, and the other, the last six, or our duty to man; according to the Masoretic arrangement, the division being made at the same place, the tables contain three and seven respectively.

Decamps, Alexandre Gabriel, a French painter, born at Paris, March 3, 1803. He studied under M. Abel du Pujol, travelled in the East, was made a Chevalier of the Legion of Honour in 1839, and died at Fontainebleau, August 22, 1860. He painted landscapes, animals, and genre and historical subjects, and was remarkable for boldness, variety of style, loftiness of conception, and genuine humour.

Decandolle, Augustin Pyrame, an illustrious French botanist, born at Geneva, 4th February 1778, was descended from an expatriated family of Protestant Provençals, to which the printer of the Caldorian Press belonged. He gave signs of poetical genius when young, but the teachings of De Saussure and Bonnet at Geneva inclined him to physical science. Coming to Paris in 1796, he was placed at the Jardin des Plantes, and devoted himself to the study of geographical botany and physiology. He enjoyed the friendship of Cuvier, Humboldt, Lamarck, Berthollet, and other distinguished *savans*. For Lamarck he edited the *Flore Française*, completed in 6 vols. in 1815. *The Histoire des Plantes Grasses* (4 vols. 1799-1803) was, however, his first important work. The popularity of his lectures on botany at the Collége de France, and an essay on the fertilisation of the Dunes on the Netherland coast, secured him an important Government mission (1806-12), viz., to report on the agriculture and botany of the territories on the Rhine and in Italy which had been added to France. In 1813 D. succeeded Broussonet in the chair of Botany at Montpelier, but was obliged in 1817 to return to Geneva, where he taught natural history, and latterly became a member of the Representative Council and of the Helvetic Diet. He died, 9th September 1841. D. is the historical successor of Jussieu. Of wide scientific vision, he has left behind him, in his *Regni Vegetabilis Systema Naturale* (2 vols. Par. 1818-21), a colossal attempt to describe all the varieties of plants, with their synonyms, and references for drawings and description of localities. His *Prodromus* of the same subject has been completed in 10 vols. (1826-46) by his son **Alphonse** (born 28th October 1806), to whom he bequeathed his herbarium of 70,000 specimens. See *Mémoires et Souvenirs* of the father by the son (1862). Alphonse, who has also written on the *Laws of Botanical Nomenclature* (1867), and on the *Geographical Distribution of Physical Groups in the Vegetable Kingdom* (1874), succeeded Agassiz as a member of the French Institute.

Decapita'tion. See CAPITAL PUNISHMENT.

Decap'oda (Gr. 'ten-footed'), the highest order of *Crustacea* (q. v.), represented by the crabs, lobsters, shrimps, &c. The D. are distinguished by the general development of the 'shell,' by the walking legs numbering five pairs, by the first and sometimes other pairs of legs being provided with *chelæ* or nipping-claws, and by the mouth appendages being numerous, and modified for mastication. The (1) *Anomurous* decapods are represented by the hermit or soldier crabs; the (2) *Brachyura* by the ordinary crabs; and (3) *Macrura* by the lobsters, shrimps, &c. See also CRAB and CRUSTACEA.

Decap'olis (Gr. 'the region of the ten cities'), a district of Palestine, lying chiefly E. of the Jordan, but including a small part of Galilee, was so named from containing ten cities, which are generally given as Damascus, Philadelphia, Rhaphana, Scythopolis, Gadara, Hippos, Dios, Pella, Gerasa, and Canatha. These cities probably held privileges from the Roman Senate, and seem to have been free from Jewish authority. D. was fully 200 miles long, with a breadth of 60.

Decazes', Élie, Duc, a French statesman, born at St Martin-du-Laye, Gironde, September 28, 1780. After holding various civil offices, he was made a cabinet-councillor by Napoleon in 1807; in 1814 became a captain in the National Guard, and fought at the siege of Paris; held office under Louis XVIII.; was made Comte in 1816, and in 1818 Minister of the Interior, in which capacity he gave great attention to commerce and manufactures. In 1819 he was made President of the Council, and shortly afterwards Duc D. After the Revolution of 1830 he devoted himself to the advancement of manufactures and art. He died 24th October 1860. D. was sagacious and tolerant, free from the intense party spirit of most French politicians.—His eldest son, **Louis Charles Élie Amanieu, Duc D.**, was born May 19, 1819, served as French Minister and Envoy at the courts of Spain and Portugal, and was elected to the Conseil Général in 1867, and to the Assembly in 1871. In 1873 he was appointed, and still continues (1876), Minister of Foreign Affairs. Formerly a leading member of the Right Centre, he has greatly contributed to the wise and moderate foreign policy of his country.

Decazeville, a town in the department of Aveyron, France, not older than 1830. It owes its existence and prosperity to its ironworks, said to be the largest in France. Pop. (1872) 4948.

Dec'can (Sansk. *Dakschina*, 'the south'), the geographical name of the portion of the Indian Peninsula S. of the Vindhya Mountains, forming a plateau from 1400 to 3000 feet high between the E. and W. Ghats. Area about 500,000 sq. miles. Pop. about 50,000,000.

Deceb'alus, a title of honour among the Dacians, probably equivalent to the English *king*. The D. mentioned by Dion Cassius was, during the reigns of Domitian and Trajan, a dangerous enemy of Rome. Between 86 and 90 A.D. he defeated the Roman generals in Mœsia, and frightened Domitian into purchasing a dishonourable peace. Trajan, however, restored the honour of the Roman arms, and after suffering several disastrous defeats D. committed suicide, A.D. 105.

Deceit'. See FRAUD.

Decem'ber (Lat. the 'tenth month' or 'period'), with us the last month of the year, but with the Romans, before the reformation of the calendar by Julius Cæsar, the tenth (hence its name), their year beginning with March.

Decem'viri, a title of various public functionaries at Rome. (1) The first and most celebrated, the *D. Legibus Scribendis*, according to the Roman legend which passes for history, entered on office, 451 B.C., for the purpose of framing a code of laws on the return of the three commissioners who had been sent to Greece to collect the laws of the different states, in accordance with the *Lex Terentilia*. Previous to their election, a dispute as to whether the 'Ten' should be patricians or plebeians, was settled in favour of the former. On their appointment all other magistrates were suspended, and the D. were intrusted, in addition to their legislative powers, with the sole government of the state, civil and military, during their year's tenure of office. They drew up a body of laws, which, after receiving the approval of the Senate and Comitia, were engraven on ten metal plates, and hung up in the comitium. At the year's end new D. were appointed, only one of the former ten, the notorious Appius Claudius, being re-elected. Their tyrannical conduct was in striking contrast to the moderation of their antecessors. Whereas before only the presiding magistrate had the fasces carried before him, each was attended now by twelve lictors, bearing not the fasces only, but also the axe, the emblem of sovereign authority. At the end of their term they refused to resign; but an unjust and shameful decision of Appius Claudius in the case of Virginia led to an insurrection of the Plebs and the downfall of the Decemvirs, 449 B.C. Two additional tables of laws were the result of their labours, which, with the ten above mentioned, formed the famous Twelve Tables—the basis of all the Roman law. (2) *D. Litibus* (or *Stlitibus*) *Judicandis*, magistrates who dealt with civil cases, were instituted about 292 B.C. Of the early history and jurisdiction of this court very little is known. Augustus gave them the presidency of the *Centumviri*; but they maintained a separate existence to the latest days of the Empire. (3) *D. Sacris Faciundis*, or *D. Sacrorum*, were members of an ecclesiastical college, and held office for life. Their chief duties were the care and inspection of the Sibylline books, and the celebration of the games of Apollo, and of the secular games. The number of these oracle-keepers was originally two (*Duumviri*), increased to ten, 369 B.C., of whom, after 367 B.C., five were patricians and five plebeians. Their number was increased by Sulla to fifteen. (4) *D. Agris Dividundis*, were occasionally appointed for dividing the public lands.

Decep'tion Island, one of the New Shetland group, Antarctic Ocean, so called from presenting to persons looking at it from a distance a striking resemblance to a ship. D. I., which is volcanic, and abounds in hot springs, is a mere ring of land, composed of alternate layers of ashes and ice, surrounding a deep circular lake, 5 miles in diameter, and communicating with the sea by an opening 600 feet wide.

Decern', in Scotch law, is to decree. Before the judgment or Interlocutor (q. v.) of any court in Scotland can be extracted so as to warrant execution, it must import a decree. Hence all extractable judgments close with the word 'decern.'

Decid'ua, a membrane formed in the interior of the pregnant uterus from the mucous membrane of that organ. At first single, it ultimately forms two layers—(1) the *D. vera*, which lines the uterus, and (2) the *D. reflexa*, which covers the exterior of the ovum. See GENERATION, PLACENTA.

Decid'uous Trees. See LEAF.

Dec'imæ Garbales, the tenth sheaf of the cut corn, which the rector of the parish had a right to take from the ground.

Decimæ Inclusæ, Teinds (q. v.) which have never been separated from the stock, and which are not demandable by the titular (see TEINDS) or minister.

Decimæ Restoriæ, parsonage tithes, due from all kinds of grain produced by culture.

Decimæ Vicariæ, vicarage tithes, due only, according to use and wont, from certain articles—wool, grass, fish, eggs, &c.

Dec'imal Frac'tion is a fraction whose denominator is any power of ten. Thus $\frac{12345}{1000}$ is a D. F., and may be written $12\frac{345}{1000}$, or simply 12·345—in which latter case it is called a *decimal*, the *point* indicating where the digits stop. The decimal portion is a mere continuation of the integral portion. Thus, in the number above, we have tens and units before the point, and tenths, hundredths, thousandths, after the point. Accordingly, the ordinary rules for addition, subtraction, &c., apply as in the case of integers. A common fraction is reduced to a D. F. by multiplying numerator and denominator by such a number as will make the latter a power of ten; thus, $\frac{1}{2} = \frac{5}{10} = \cdot 5$; $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = \cdot 75$; $\frac{2}{3} = \frac{2 \times 333}{3 \times 333} = \frac{666}{999} = \cdot\dot{6}$. In this last case there is no power of ten divisible by three; but the farther we take the multiplier 3333 . . . we can make the denominator nearer a power of ten than by any given difference; and accordingly we say $\frac{2}{3} = \cdot\dot{6}$; where $\dot{6}$ means 6 repeated as often as necessary for the approximation.

Decimal fractions seem to have been introduced by Regiomon-

tanus, in 1464; but the first treatise on the subject is the *Practique d'Arithmétique* of Steirnus (1582). This mode of calculation is now almost universally practised in the civilised world.

Deci'mal Notation. See NOTATION.

Decimal Sys'tem of weights, measures, and coins, is a subject which has of recent years attracted great attention, both at home and abroad. On account of the facilities which it offers for calculation, it will no doubt in time supersede all the old and cumbrous methods; and when that is effected throughout Europe, it will be the first step towards establishing a universal and international system. The most perfect example of the D. S. is found in France, though the same principle obtains in the coinage of the United States, Belgium, Italy, Spain, Portugal, and other countries. The French unit measure of length is the *metre* (=39·3709 inches): the superficial unit is the *are* (100 sq. metres; the solid measure, the *stère* (1 cubic metre); the liquid or dry measure, the *litre* (1 cubic decimètre); and the unit of weight is the *gramme*, being the weight of a cubic centimètre of pure water at a temperature of zero centigrade. The *deca-*, *hecto-*, *kilo-*, *myria-gramme*, &c., represent respectively 10, 100, 1000, 10,000, &c., grammes; while *deci-*, *centi-*, *milli-gramme*, &c., are respectively 1, ·01, ·001 parts of a gramme. The same prefixes are similarly used with the other measures. The unit coin is the *franc*; the *décime* and *centime* being respectively ·1 and ·01 of a franc. The former, however, is not now used—accounts being kept simply in francs and centimes.

Decima'tion (Lat. *decem*, 'ten'), a military punishment, by which every tenth man was selected by lot for death, when a large body of men had in concert committed some grave military offence.

Dec'imi, in music, a name sometimes used for the interval of a tenth, or octave and a third.

Deci'sion. The D. of a court is its pronounced judgment in a cause. In Scotland, the word is usually applied to the printed reports of cases decided in the Court of Session. In England the decisions of courts of law carry greater authority in determining the law than they do in Scotland; though in the latter country, two or more consecutive decisions of the Court of Session, not changed by the House of Lords, are held to determine the law.

De'cius, the name of a plebeian family famous in Roman legend through the heroic self-sacrifice of two of its members. **Publius D. Mus**, one of the consuls in the Latin war of 340 B.C., at a battle near Vesuvius, when his troops were wavering, sought death in the ranks of his enemies after solemnly devoting himself and them to the infernal gods. The sacrifice was accepted, and victory remained with the Romans. His son, also **Publius D. Mus**, imitated, with the same happy result, the paternal example on the battle-field of Sentinum, 295 B.C., and closed a brilliant career by a patriotic death. Among the later emperors one bore the name of D. His full name was **Cajus Messius Quintus Trajanus D.**, but he was a Pannonian by birth, and no relation of the old Roman family. Elected emperor by the soldiers of Mœsia in 249 A.D., he ruled vigorously for two years, but in 251 fell in battle with the Goths. His reign is chiefly memorable for a fierce persecution of the Christians.

Deck (Old Eng. *decan*, 'to cover;' comp. Ger. *decken*, allied to the Lat. *tegere*, and Gr. *stegein*), the planked floor or platform of a ship, laid on transverse beams and half beams, and longitudinal carlings supported on pillars, and intimately secured to the sides of the vessel. Besides providing accommodation and shelter, decks are of great structural value in binding together the sides of the ship, and in maintaining its proper form. They are slightly curved transversely to facilitate the free flow of water to the scupper holes. A large vessel is usually constructed with upper, main, lower, and orlop decks; the last named being lowest, and used for stowage of cables, &c.; and over the upper deck, at opposite ends of the ship, are the forecastle and quarter-deck.

Deck'er, Sir Matthew, was a Dutchman naturalised in London, where he began business in 1702, received a baronetcy for his commercial eminence in 1716, and entered Parliament in 1719. He died 18th March 1749, having served only four years in Parliament. In 1739 D. wrote an essay on the causes of the decline of foreign trade, consequently of the value of the lands of Britain, and of the means to restore both. In 1743 appeared the pamphlet, which reached a seventh edition in 1756, containing what is known as D.'s scheme. It is best described by the title:—*Serious Considerations on the several High Duties which the Nation in General (as well as Trade in Particular) Labours under; with a Proposal for Preventing the 'Running' of Goods, Discharging the Trades from any 'Search,' Raising all the Public Supplies by one Single Tax.* This was a house-tax, which D. calculated would bring in £6,000,000 per annum.

Declara'tion, in English law, is the pleading in which a plaintiff in an action at common law states his case against the defendant. See JUDGMENT, DEFAULT, NOLLE PROSEQUI, PLEADING.

Declaration, Dying. In England and in Scotland the general rule of law is that secondary or hearsay evidence is inadmissible in a trial; but testimony given by any one in the belief of impending death, who does not live to be examined at the trial, is an exception to the rule. It may be proved by parole evidence; but will probably have greater weight if written and duly tested. In case of murder the D. D. of the murdered man weighs heavily. Evidence of this kind is admissible in favour of the accused as well as against him.

Declaration in Criminal Procedure. In Scotland the statement, if any, made by a prisoner, on being apprehended and brought before a magistrate, is called his declaration. It is the duty of the magistrate to inform the prisoner that it is optional for him to make a declaration or not, but that, if he does, it may be used against him at the trial. If the prisoner chooses to make a statement, and be in a fit state of mind to do so, and does not appear to be under the influence of promises or threats, his narrative and answers on examination are written, and read over to the prisoner, who along with the magistrate must sign each page of the document. If the prisoner cannot write, the magistrate must sign on his behalf. The examination is commonly conducted by the Procurator-Fiscal (q. v.). The declaration not being on oath, has no force against any one but the prisoner.

Declaration in Place of Oath. Quakers, Moravians, and Separatists objecting on religious grounds to take an oath are, in civil and criminal cases, allowed by statute to substitute a declaration or *Affirmation* (q. v.). This privilege is only accorded to other Christians in civil cases. A false declaration is *Perjury* (q. v.). See also OATH.

Declaration of Title. By Act 25 and 26 Vict. c. 67, persons having an interest in land in England may, under certain circumstances, obtain a judicial declaration of their title, so as to enable them to give an indefeasible title to a purchaser for a valuable consideration. The declaration is asked for by petition to the Court of Chancery. No petition is admissible as to Copyhold (q. v.) land or customary tenure. Appeal and petition against declaration are allowed. Similar procedure is competent under Scotch law by what is called Declarator (q. v.).

Declar'ator, a form of action before the Court of Session in Scotland, by which judicial recognition is sought of some right which the pursuer (plaintiff) supposes himself to possess. Where the declaratory conclusions regard property, they are generally, though not necessarily, followed by petitory or possessory ones. In an action of D., the pursuer must show the consequent right which will accrue to him on the court making the declaration asked for. The form of action is a common one in questions of constitution of marriage. (See MARRIAGE.) Declaratory action, which is a valuable and important form in the law of Scotland, is being limited in its application in English law. See DECLARATION OF TITLE.

Declension (Lat. *de*, 'down,' and *clino*, Gr. *klino*, 'I bend;' literally the *bending down* of a word's terminal letters), is the system of the changes of form or cases by which nouns, pronouns, and adjectives express their various relations to other words. These cases are distinguished by changes in the word to be declined, or by using separate words (prepositions); and from one point of view there might be as many cases as prepositions

in a language. In the Aryan tongues the case-endings have been formed by the fusion of separate words, and their origin is almost unknown. Languages tend to simplify D. In the oldest Aryan (q. v.) tongues we find a rich system of declensional forms, which gradually disappears from more modern tongues. No fewer than eight cases occur:—The *Ablative*, denoting the relation *from*, and ending in *t* or *d*—*e.g.*, old Latin *ecquod*, from a horse; the *Locative*, denoting the relation *in*, and ending in *i*; the *Instrumental*, denoting the relation *with* or *by*, ending in *a*; the *Dative*, the relation of *for* before a noun, ending in *ai*; the *Genitive*, denoting possession, ending in *asya* or *as*; the *Accusative*, ending in *m*, and denoting that the word is the object of the action of a verb, or is governed by a pronoun with the sense of motion towards; and the *Vocative* or interjectional case, identical in form with the Nominative, which originally ended in *s*. In Latin we find the Locative and Instrumental fused with the Dative and Ablative. In modern Romanic languages the declensional endings have almost vanished. Old English had Nominative, Genitive, Dative, Accusative, Vocative, and Instrumental cases (see ENGLISH LANGUAGE), and several plural endings, *as*, *an*, *u*, *a*, *o*. Now there are only three cases—*Nominative* (Lat. *nomino*, 'I name'), the form in which a noun is used when it is the subject of a sentence; the *Possessive* (Lat. *possideo*, 'I possess'), the form denoting possession; and the *Objective* (Lat. *objicio*, 'I throw towards'), used when a noun is the object of the action of a verb, or comes after a preposition. The Possessive expresses a relation by the suffix *'s*, a contraction from the Old English genitival ending *es*. The difference between Nominative and Objective is determined solely by the sense and position of the words. See Morris's *Historical Outlines of English Accidence* (Macmillan, 1873), Whitney's *Lectures on Language*, and Latham's *English Language* (Lond. 1841; new ed. 1865).

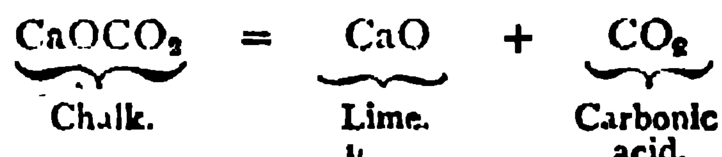
Declina'tion, in astronomy, is the angular distance of a heavenly body N. or S. of the celestial equator, and is measured along the arc of a great circle passing through the body and the poles. It corresponds to *latitude* in geography.

Declination of the Magnet'ic Nee'dle is the angle of deviation from the true astronomical N. of a magnet suspended so as to have free motion in a horizontal plane. This deviation is of course due to the change in position of the magnetic pole, and is undergoing a continual alteration for each locality. From observations made at Paris since the year 1580, the D. has altered from 11° 30′ E. to 20° 20′ W. in 1852, a total variation of 31° 50′. In 1663 the needle pointed due N., the D. being then zero. The magnetic meridians are so drawn that the tangent to the curve at any point represents the direction in which the D. needle points; and these meridians all converge towards the spot where Sir J. C. Ross found the angle of inclination to be 89° 59′, or nearly perpendicular. (See DIPPING-NEEDLE.) The D.-needle for measuring this variation is a highly magnetised needle delicately suspended in a closed box, which is surmounted by a telescope for ascertaining the true astronomical N.

Declin'ature, a term of Scotch law denoting objection to the jurisdiction of a judge. This may be on the ground of his being interested in the suit, or of the case being beyond his province, or of his bearing enmity to one of the parties, or of his being too nearly related to one of them.

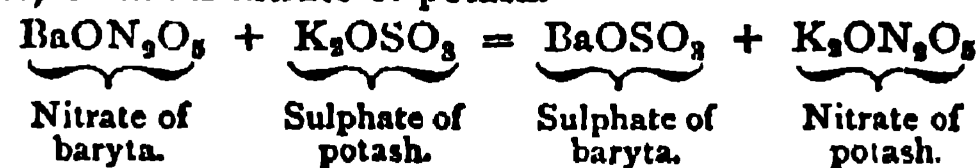
Decoc'tion (Lat. 'a boiling down'), a medicinal preparation obtained by boiling for a longer or shorter period some vegetable substance in water. See INFUSION.

Decomposi'tion, in chemistry, signifies the breaking up of a compound into its elements, or into substances of a less complex nature than itself. Thus the passage of the electric current through water (slightly acidulated to make it conduct) causes its D. into the elements of which it is composed, viz., oxygen and hydrogen. Again, the action of a high temperature on chalk (carbonate of lime) is to cause its D. into lime and carbonic acid.



$$\underbrace{CaOCO_2}_{\text{Chalk.}} = \underbrace{CaO}_{\text{Lime.}} + \underbrace{CO_2}_{\text{Carbonic acid.}}$$

Double Decomposition is an expression used by chemists to signify the change which occurs when two compound substances act upon one another in such a manner that the groups of which each may be considered as composed are mutually interchanged. Thus, when solutions of nitrate of baryta and sulphate of potash are mixed, a white precipitate of sulphate of baryta is produced, and the solution (which may be filtered from this precipitate) contains nitrate of potash.



$$\underbrace{BaON_2O_5}_{\text{Nitrate of baryta.}} + \underbrace{K_2OSO_3}_{\text{Sulphate of potash.}} = \underbrace{BaOSO_3}_{\text{Sulphate of baryta.}} + \underbrace{K_2ON_2O_5}_{\text{Nitrate of potash.}}$$

The nitric acid (N_2O_5), before combined with baryta (BaO), has now become transferred to the potash (K_2O), before combined with sulphuric acid (SO_3), whereas the sulphuric acid has left the potash, and has combined with the baryta. Both of the original compounds have been decomposed, and in their place two new ones have been produced. Such changes are of frequent occurrence.

Decomposition of Forces. See COMPOSITION, &c.

Dec'orated Style, also called the Middle, Pointed, or Edwardian style of Gothic architecture (Fr. *ogival secondaire*), arose naturally out of the Early English, First Pointed, or Plantagenet style, and as naturally led to the Perpendicular, Third Pointed, or Tudor style. These three styles of Gothic may be said—without meaning to affix precise dates—to have flourished in England during the 13th, the 14th, and the 15th centuries respectively. Decorated English, the architecture of the 14th c., flourished, according to Rickman, from 1307 to 1377, and according to Fergusson, from 1272 to 1377. During this period, and for some time previously, all the artistic genius of the country seems to have found expression in the noble buildings which arose everywhere. The amount of mental activity and enthusiasm striving after perfect architectural form during this time resulted in the erection during the D. or middle period of Gothic of the most perfect mediæval structures in England. From the D. period, Gothic architecture declined, and gave way eventually to the classical Renaissance. The arrangement of buildings remained the same in the period under consideration as in the First Pointed or Early English period, distinguished by the greater variety, freedom, and richness of the ornamentation. The arches of the windows were still pointed as in the First Pointed style, but the head of the arch was decorated with richer and much more intricate and delicate ornamentation. The vaulting was also richer and more intricate. This richness was obtained by the introduction of intermediate ribs, which, crossing each other, produced stars and other figures at the points of intersection. In the earlier part of this period the window tracery was geometrical, consisting of circles, triangles, &c.; in the latter, flowing curves were introduced into the window tracery. In D. Gothic, mullions were employed instead of pillars and shafts for windows, and in the carving of capitals a greater freedom of execution and wealth of lavish ornament are observable. New mouldings and new applications of carvings and foliage were introduced; decorations in colour, painted glass, and mural paintings were carried to an astonishing degree of perfection. This marvellous development of architecture in England took place by the exercise of native genius alone, and was in no sense due to imported art or extraneous aid of any kind. In some instances the traditions of French arrangements were adhered to, as at Westminster Abbey; 'but even there,' says Fergusson, 'the design is carried on in so English a manner, with details so purely English, as to make us feel even more strongly how essentially native the style had become.' Lincoln Cathedral, the W. front of York Minster, parts of Ely, Lichfield, Worcester, Winchester, Norwich, and Canterbury Cathedrals, and Hexham, Howden, Dorchester, Adderbury, Stanton-Harcourt, and Bloxam Churches, may be mentioned as characteristic examples of this style. See Fergusson's *History of Architecture in all Countries* (Murray, Lond. 1874).

Decou'plé, or **Uncoup'led**, in heraldry, means, parted or severed; applying, for example, to the ends of a Chevron (q. v.).

Decoy'ing of Children. See ABDUCTION.

Decree', in England, is the decision of a court of equity, and is the same as judgment at common law. In Scotland, D. or *decreet* is the final judgment of a court. Decrees are either *condemnator* or *absolvitor*; the former is the term when decision is in favour of the pursuer, the latter when in favour of the defender. See DECERN.

Decree in Absence, in Scotland, is equivalent to nonsuit against a plaintiff, or 'judgment by default' against a defendant in England. Where a D. in A. is sought to be reduced, the party seeking reduction must pay the expenses previously decreed for; and if he obtains the reduction, he is not entitled to repayment of these previous expenses.

Decrees of God, in the language of theology, are 'his eternal purpose, whereby he hath foreordained whatsoever comes to pass.' The doctrine (as *dogma*) originated with Augustine, and rests on the two postulates of Original Sin inherited from Adam in consequence of the fall, and the irresponsible Sovereignty of God. From these premises Augustine argued that an absolute election of certain individuals to eternal life, though resulting purely from the divine will, is not unjust. For since, both by original and actual sin, all are transgressors of God's law, it were no injustice if all had been left to perish; therefore there is no injustice in the free election of some to eternal life. The complement of which is, that since the number of the elect can neither be increased nor diminished, all the rest of mankind are personally reprobated to eternal damnation. But, even among those who are agreed as to the nature of the D. of G., there have been two views as to the order in which they took effect: the one called the Supra-lapsarian, the other the Sub- or Infra-lapsarian. According to the first, Election and Reprobation preceded the purpose to create the world and permit the fall, and therefore God created some men to be saved and some to be lost. According to the second, God decreed -1st, the creation of the world; 2d, the fall; 3d, the election of some to eternal life; 4th, the redemption of the elect; 5th, to leave the residue of mankind to suffer the just punishment of their sins. See Hodge's *Systematic Theology* (1873).

Decrepita'tion (Lat. *de* and *crepitare*, 'to crackle') is defined in Johnson's Dictionary as 'the crackling noise which salt makes over the fire.' This crackling sound is often observed when other salts are heated. It is caused by the sudden conversion of small quantities of water contained within the crystals into steam, which bursts them in pieces.

Decrescen'do (Ital. 'diminishing'), a mark of expression used in music to indicate a gradual decrease of loudness unaccompanied by any alteration in speed.

Decre'tals, The, form the second and smaller part of the Corpus Juris Canonici of the Church of Rome. It was added in 1230 under Pope Gregory IX., and comprised all the additions to the canon law, in the shape of judicial replies by ecclesiastical authorities to cases submitted to them, which had been made since the publication of the *Decretum*, or first part, in 1150. See Blunt's *Dict. of Doctr. and Hist. Theology* (1872).

Decretum et Decretalia. The body of the canon law consists, first, of the *Decretum*, which is a collection of the opinions of the fathers, popes, and Church councils made by a Benedictine monk towards the close of the 12th c., in imitation of the Roman Pandects; and, secondly, of the *Decretalia*, which were collected by Pope Gregory IX. nearly a century afterwards from the decretal rescripts or epistles of the popes. See CANON LAW.

Decussa'tion, a term used in anatomy to denote the crossing of fibres from one side to the other. Thus we have the D. of the fibres of the optic nerves, and the D. of the motor fibres of the Spinal Cord (q. v.) in the *Medulla oblongata* (q. v.).

Ded'imus Potesta'tem ('we have given power') is a writ of Chancery authorising commissioners to take an examination. When a justice intends to act under a commission of the peace, he sues out a writ of D. P. from the clerk of the crown in Chancery, empowering persons named in the writ to administer the oaths previously required.

Deduc'tion is a species of reasoning, of which the most important examples are to be found in mathematics and general physics. D. starts from a known truth, law, or proposition, and passes to a previously unknown, *i.e.*, previously unexplained, truth. The premise in D. may be in the shape of a universal proposition: its generality, of course, varies with the more or less abstract nature of the subject-matter. The conclusion may be in the shape of a particular proposition, but may also be a principle of wide application; sometimes of precisely the same width as the premise. D. is generally opposed to induction, or the inference of a general conclusion previously unknown from a comparison and sifting of particular instances. Practically the modes differ, and are, indeed, opposite: but substantially, and in the end, the mental process is the same; it is the identification of similars under the variety of conditions. The assumption which underlies D. as well as induction, and which renders their conclusions true in fact as well as formal in logic, is that from identical conditions, positive and negative, the same result invariably follows. Hence the rules of the syllogism which have been contrived to test the validity of inferences, and which by Hamilton, Ueberweg, and others, are applied to induction as well as D., must not be confounded with the act of inference itself. By the use of symbols sufficiently abstract and significant the principal forms of inference may be adequately represented (as by Jevons) in the equation or substitution of similars by a logical engine (exhibited at the Royal Society), or (as by Boole) by means of a special mathematical formula. The type of D., however, will always be: All A is B; C is A, ∴ C is B. But the combination of two general propositions, where their joint result admits of being calculated, leads to still more important results. In such inexact sciences as history, all that D. can accomplish is to explain and make rational the previous empirical generalisations or inductions.

Dee (probably connected with the Cymric *dyfi*, 'smooth'), the name of several rivers in the island of Britain, of which the most notable are— 1. The D. in England, which, rising in Merionethshire, traverses parts of Denbigh, Flint, and Cheshire. From Chester, where it is 100 yards broad, it is conveyed by an artificial tidal canal, 9 miles long, and navigable for ships of large burden, into the noble estuary which connects it with the Irish Sea. It has a course of 80 miles. Its waters were deemed sacred by the ancient Britons. Drayton, in his *Polyolbion*, calls it an 'ominous flood;' and Milton, who refers to it (in *Lycidas*) under the name of *Deva*, speaks of its '*wizard* stream.'—2. The Aberdeenshire D., which has its sources in five wells near the summit of Braeriach, and after a course of 96 miles falls into the German Ocean at Aberdeen. About 6 miles above Castleton of Braemar it rushes through a narrow cleft called the Linn of D. Twelve miles of its course is through Kincardineshire, after which it retouches Aberdeenshire, and thenceforward forms the boundary between the counties. Balmoral Castle is on the D.—3. The Kirkcudbrightshire D., which rises in the N. of the county, pursues a south-easterly course of about 4 miles, and then unites with the Ken. After a further lake-like course of 10 miles, it falls into the sea at Kirkcudbright. It is navigable for 7 miles from its mouth.

Dee, John, a celebrated mathematician and astrologer, was born at London, 12th July 1527, studied at Cambridge and Louvain, at the latter of which places he took the degree of Doctor of Civil Law. He returned to England, obtained Church preferment, and a pension under Edward VI., nearly lost his life in the reign of the 'Bloody Mary,' and acted as Queen Elizabeth's 'intelligencer' or political agent. Meanwhile he had gained the reputation of a sorcerer, and in 1574 his country residence of Mortlake was 'wrecked' by a mob, himself and his family escaping with difficulty. How far D. claimed to be an astrologer is doubtful, but it is certain that he was an alchemist, and along with a man named Kelly visited various Continental courts pretending to raise spirits. Returning once again to England, he became Warden of Manchester College, and held the office for nine years. D. died, December 1608, in great poverty, leaving behind him many works, chiefly of a scientific character, which in manuscript are embedded in the Cottonian and other collections. In 1842 D.'s private diary was published by the Cambridge Society. See *Athenæ Cantabrigienses*.

Deed, in law, is a formal written instrument, executed and authenticated according to certain technical forms (see COMMON FORMS), setting forth the terms of an agreement. Every D. requires a party or parties capable of contracting obligation, and subject to no legal disqualification, actual or presumed. See CONSENT, IDIOT, PUPIL, MINOR, MARRIAGE; DEATHBED, LAW OF; BANKRUPT, CONJUNCT, CONFIDENT, FRAUD. A D. must be founded upon a valuable consideration (see CONSIDERATION), not on fraud or collusion to deceive purchasers or creditors. The last requisite to a D. is the attestation or

execution of it in presence of witnesses, though this is in most cases only required for preservation of evidence, the attestation not being an essential part of the D. For manner of execution in England, see SIGNING, SEALING, and DELIVERY. For Scotland, see TESTING-CLAUSE, WITNESS, REGISTRATION OF DEEDS AND WRITS, HOLOGRAPH.

It is not essential to a D. that it should be dated. Where no date is inserted, the time will be reckoned from the delivery. See CHARTER, WILL, DISPOSITION, INDENTURE, DELIVERY OF A DEED.

Deed Poll, in the law of England, is a deed made and executed by one party. The etymological derivation of the term is that a D. P. is *close cut* or shaved, while an Indenture (q. v.) is indented at the top.

Deem'ster, Dempster, or **Doomster** (orig. *Demer* or *Demere*, 'a judge,' from *deman*, 'to judge,' mod. 'deem'-ster (orig. *stre*), being a feminine termination), the name given in Scotland to the officer who formerly pronounced the doom (Old Eng. *dom*) or sentence of death on condemned prisoners in the High Court of Justiciary. His office of D., to which was superadded that of public executioner, no longer exists. In the Isle of Man the word retains its primary meaning, for there the 'demsters' are *judges*.

Deer (Old Eng. *deor*, any wild animal or beast; comp. Ger. *thier*, Lat. *fera*, Gr. *thēr*), a family of *Ungulata*, or hoofed quadrupeds, belonging to the Ruminant (q. v.) division of that group. The D. are *Artiodactyle* ungulata, that is, possess an even number of toes. The horns or antlers of the D. are, firstly, of solid nature; and, secondly, are deciduous, or shed annually. This first character distinguishes them from the Antelopes (q. v.), which belong to the family *Cavicornia* or 'hollow-horned' ruminants, and which are not in any sense to be confused with the *Cervidæ* or D. The antlers are more or less branched; the number and complexity of the branches increasing as the animal advances in years. They are shed and reproduced at the breeding season, and are borne on the frontal bone. They are reproduced by a process resembling that of the production of new bone in man. A sensitive, hairy, and vascular skin, named the 'velvet,' at first covers the antlers, but as growth proceeds is worn off. The horns of the *Cervidæ* are borne, with the exception of the reindeers, by the males alone. The other characters of this group comprise the presence of a *tear-pit, larmier*, or *lachrymal sinus*, a gland of sebaceous nature, situated beneath each eye. This structure secretes a waxy substance, the function of which is undetermined, although from its strong odour it has been thought to be associated with the sexual instincts of these animals. The teeth generally number thirty-two, and, as in all ruminants, no upper incisors exist. The lower incisors number six, the lower canines two, the præmolars and molars six in each jaw. In some D. (*e.g.*, Muntjak), upper canines exist. D. are found all over the world, save in Australia and S. Africa. The antelopes, indeed, take the place of the D. in the latter continent. The more important species of D. will be described in special articles (*e.g.*, CARJACOU, REINDEER, STAG, ELK, &c.). The Musk D. (q. v.), (*Moschidæ*), it may here be noted, form of themselves a distinct family. They are distinguished from the *Cervidæ* chiefly by the presence of canine teeth in both jaws, and by the absence of horns in both sexes. The canines of the males form tusks, but those of the females are of small size.


Red Deer (Male).

Deer, or **Deir, Old** (Gael. *dēr*, now *deur*, 'a tear,' from Drostan's tears at parting with Columba; or more probably *dair*, 'an oak'), a parish of Buchan, Aberdeenshire. St Columba and St Drostan planted a church here about 580. Two miles W. of the parish church stood a Cistercian abbey, founded by William Cumyn, Earl of Buchan, about 1219. The land, now largely peat-moss, was once covered with oaks. For local culture, a Club of D. was formed, 1868. See Peter's *Peat-Mosses of Buchan* (Aberd. 1876).

Deir, Book of. After the Reformation, some MSS. of the Abbey of Deir found their way to the library of Cambridge University. Mr H. Bradshaw, of that library, discovered in 1860 among them the B. of D., containing the Gospel of John, with parts of the other Gospels, in Latin, in the writing of the 9th c.; also Visitation of the Sick, with a Celtic rubric of a later date. In writing of the 12th c. are various Celtic notes, relating that Columcille and Drostan came from Hi to Aberdour, and received a grant of Deir. This rare and authentic Gaelic memorial sheds much light upon that period. See Stuart's *B. of D.* (Spalding Club, Edinb. 1869).

Deerhound, or **Staghound,** a variety of dog closely allied to the Bloodhound (q. v.), and believed to result from the interbreeding of the latter with the greyhound. The D. is a large dog, with hair of moderate length, and generally of light-brown or tawny colour. It possesses great speed, strength, and powers of endurance. Its scent is also powerful, and it is courageous enough to often master an infuriated stag at bay. When stag-chasing was in vogue, this breed of dogs was much cultivated, but lately it has been much neglected. The D. used in Deerstalking (q. v.) is either the staghound proper, or a breed in which this latter variety is represented.

Deer-Mouse, or **Jumping-Mouse** (*Meriones*), a genus of *Rodentia* found in America, recognised by the great relative length of the hind-limbs, and by the want of hairs on the tail. They also differ from the ordinary mice in some insignificant details in their dentition. The best-known species—the Canadian J. M. (*M. Canadensis*) and the *M. Labradoricus*—hybernate in winter.

Deerstalking, the art of tracking deer for the purpose of shooting them. The hunter is obliged to resort to a series of manœuvres on account of the delicate sense of smell and cautious instincts of the game. Typical D. is only practised in the Scottish Highlands. A perfect knowledge of the entire 'forest' or deer-ground is the first essential in the sportsman or his guide, since advantage may sometimes have to be taken of the most apparently trifling feature which the ground may present. The dogs or deerhounds employed must be trained to perfect silence and obedience. The deerstalker is greatly at the mercy of the wind and weather. The fine scent of deer necessitates the hunter's advance up or against the wind; whilst concealment, through wearing a dress of much the same colour as the ground, and by cautiously moving about under shelter, must be attended to. Advance from *higher* to *lower* ground upon the game is generally preferred, as the deer are apt to look to the low ground as the source of danger; and in valley and low-ground stalking, frequently advance has to be made in the prone position. The deerstalker may at length arrive within a hundred yards of the quarry, and selecting the finest animal of the herd, aims for the shoulder, or slightly behind this point. When the deer is not mortally wounded, the hounds are slipped, and chase is begun. The attendant 'gillies' disembowel the dead deer; this process, termed *gralloching* in hunting parlance, being supposed to keep the flesh from becoming tainted. 'Driving' the deer towards certain points is employed when a large party of shooters are present, but this latter procedure has none of the finesse of true 'stalking.'

Deer-Stealing. This offence, if committed in the enclosed portion of a park, is by statute felony, punishable by two years' imprisonment with hard labour. If the deer be in unenclosed ground, the punishment for the first offence is a fine not exceeding £50; in the latter case, a second offence is felony. In Scotland, shooting deer in a park without permission is regarded as theft; if the deer is outside the park, the offence is punishable by fine. A proprietor is not entitled to kill deer trespassing on his property, but he may drive them off.

De Facto is, in law, a thing actually done or existing. A king *de facto* is one in possession of sovereignty. A king *de jure* is one who is considered to have a right to a crown, but is not in possession.

Defæca'tion, the act of voiding the fæces by the anus, is accomplished by the combined contraction of the abdominal muscles, and the simultaneous opening of the sphincter or ring-like muscle which keeps the anal opening closed. Previous to the action of the abdominal muscles, the glottis is closed so as to

prevent the upward motion of the diaphragm, and thus the abdominal wall presses with advantage on the bowels. These actions are assisted by the contraction of the walls of the rectum. The anal opening is controlled by a ganglionic nerve-centre situated in the lower part of the spinal cord, subject, to a certain extent, to the control of the will. Thus D. may be delayed by powerful efforts of the will, but if the fæces press firmly on the inner surface of the *sphincter ani*, the effort of the will is soon of no avail. According to most authorities, the desire for D. is the result of the sensation caused by the descent of the fæces from the sigmoid flexure of the colon into the rectum. In some circumstances, however, the rectum may be loaded with fæces without any desire to void them.

Defama'tion. See LIBEL.

Default' is an English law-term usually held as expressing the fact of non-appearance in court on the day assigned, though the term is applicable to any omission. If a plaintiff makes D. in appearance, he will be nonsuited. D. on the part of a defendant ensues in 'judgment by default.' In either of these cases, the party may be reponed on payment of expenses.

Defeas'ance, Deed of, in English law, is a deed which counteracts the operation of another deed. A provision in a deed which modifies the main provision is called a *condition;* when the modification is by a separate deed it is called a *defeasance,* which may be held fraudulent, but is not necessarily so. For Scotch law as to this, see DISPOSITION ABSOLUTE, WADSET.

Defen'ces, in Scotch law, is the general name given to the pleas offered for the defender for cutting away the grounds of action stated in the Libel (q. v.). Such pleas are generally all stated in the first paper put into process for the defender; and in the judicial procedure in ordinary actions that paper is called the D.

Defen'dant. In English law, he who begins an action is termed the *plaintiff;* the person against whom it is brought is termed the *defendant.* In Scotch law, the name used is *defender.*

Defen'der of the Faith, a title conferred on Henry VIII. by Pope Leo X. in 1521 for the vigour of his orthodoxy. Though recalled on the King's espousing the cause of the Reformation, it has been used by English sovereigns ever since.

De Fide'li. The oath *de fideli administratione* is an oath taken by persons on entering on the duties of some public appointments. A breach of it does not constitute perjury.

Defila'ding, in fortification, is divided into horizontal and vertical. The object of the first is to direct the faces of a work so that the enemy cannot enfilade the lines or take them in reverse; and of the last, so to arrange the height of the rampart that the enemy cannot see into it, and that the interior may be safe from direct fire.

Defile' (Lat. *filum,* 'a thread'), in military language, any passage so narrow that troops can traverse it only in *file,* or with a small number abreast.

Def'inite Propor'tions. See ATOMIC THEORY.

Defini'tion (Gr. *horismos*) is the complete and orderly statement of the contents of a notion. It must at least contain the superordinate or genus notion, and the specific difference which makes the species distinct. D. is so used as a powerful weapon of dialectic by Plato in the *Gorgias,* where he defines rhetoric, and in the *Republic,* where he defines the virtues. The Greek terms used in the *Theætetus* for genus and species are *koinon* and *diaphora.* Aristotle calls D. the exact knowledge (*gnōrismos*) of a substance. 'Specific difference' is a translation by Boethius from Aristotle's phrase *diaphora eidopois.* The rule is, that D. should mention the proximate genus, but this is not always followed—*e.g.,* a circle is never defined as a conic section, but as a plane figure. The connection in which a D. is given will often suggest that a remoter genus and a larger specific difference should be used. Opposite views of D. are to be found in Hegel, who merges D. in the dialectical genesis of the notion, and Mill, who maintains that D. is merely of the meaning of names, and not of things. All names, even those denoting a single abstract quality, which have a meaning, may therefore be defined, if not from their content or connotation, then from their causes. Mill, therefore, does not recognise the ordinary division of real and nominal definitions. The meanings of substantial and genetic, essential and attributive D. will be found in works on formal logic. D. obviously merges into exposition, description, and explanation, and different definitions of the same notion are possible where a reciprocal dependence of essential attributes exists; as in the various definitions of a circle by the curve of the straight line which produces it, by the equidistance of points in the circumference, and by the section parallel to the base of the right cone. The great faults of D. are too great width or narrowness, redundancy, tautology, figurative expression, or mere negations, or reference to subordinate notions. The circle or *dialellon* occurs where A is defined by B, and then B by A—*e.g.,* 'A feeling is pleasant when it is desired because of itself.' Plato's D. of the idea of good as the sun in the kingdom of ideas is a splendid specimen of figurative D.

Deflec'tion, a name applied generally to mean a change of direction of motion. In optics it is synonymous with Diffraction (q. v.).

Deflux'ion. See CATARRH.

De Foe, Daniel, an English classic, was born in London in 1661. He was intended for the Dissenting ministry, but, after leaving Newington Green School, became an agent in the hosiery trade. He began writing pamphlets at the age of nineteen, joined Monmouth's rising in 1685, traded to Spain for wool, became bankrupt in 1692, started a pantile manufactory, and in 1695 was made accountant to the commissioners of glass-duties, an office which he held until 1699. In 1701 his *True Born Englishman,* a satire in favour of William III., won him that king's good-will, but in 1703, the irony of his *Short Way with the Dissenters* being misunderstood, he was imprisoned until 1704, when he was liberated through the influence of Harley, and taken into Government service. In 1706 he was sent to Edinburgh as a secret agent to promote the Union—a mission which he skilfully executed. On the accession of George I., D. did not, as was once supposed, retire from his connection with Government, but was employed to write under Jacobite colours, and thus, as he said, 'take away the sting' from an obnoxious journal. During his later years he betook himself to fiction, publishing *Robinson Crusoe* in 1719, and *Moll Flanders, Journal of the Plague, Colonel Jack, Captain Singleton, Duncan Campbell,* and *Roxana* between 1720 and 1724. He wrote also *Memoirs of a Cavalier* (undated). He died at London, April 6, 1731. D. was a patriotic controversialist, honest in his aims, if not very scrupulous in his means. His voluminous writings amount to 210 works in prose and verse, but his fame as a novelist has led to forgetfulness of his labours as a pamphleteer. His style is homely, graphic, and perspicuous, and his vocabulary is of almost Shakespearian richness. His novels are autobiographic in form, and characterised by an irresistible air of veracity, due to his skilful manipulation of minute and prosaic incidents. *Robinson Crusoe* is a universal source of delight. See Lee's *Life of D.* (1869), Masson's *British Novelists,* and *D.'s Works,* edited by Sir Walter Scott, 9 vols., in Bohn's *British Classics.*

Deforce'ment, a term of English law, denoting the holding of any land or tenement to which another has the right. The party wrongfully keeping possession is called the *deforciant.* In Scotch law, D. is an act of contempt of the law, consisting in violent opposition of a duly empowered officer in the execution of his duty. In extreme cases D. may be held a capital crime.

Defraud'ing of Credit'ors. Creditors may be defrauded by the funds of their debtor being concealed, by their being conveyed to favourite creditors, or by the undue increase of debts against the estate of the debtor. Creditors have redress by common law and under the bankruptcy statutes of England and Scotland. See BANKRUPTCY.

Defrauding the Revenue.—Any contrivance by which an imperial tax or duty is evaded constitutes this offence. By the treaty of Union between England and Scotland, the law regarding it is the same in the two countries.

Degeran'do, Jos. Marie, Baron, a French philanthropist and philosopher, was born at Lyons, 29th February 1772, and after various vicissitudes served in the army of Massena as a com-

mon soldier. While thus employed he wrote, among other philosophical treatises, *Histoire comparée des Systèmes de Philosophie, relativement aux Principes des Connaissances Humaines* (Par. 1803), which is considered one of the best French works on the philosophy of history. In 1804 he was admitted into the Académie des Inscriptions et des Belles Lettres, while he also rose high in office under Napoleon. D. was a philanthropist as well as ethical philosopher, writing *Le Visiteur du Pauvre* (Par. 1820), *Education des Sourds-Muets de Naissance* (Par. 1827), and *Des Progrès de l'Industrie* (Par. 1841). He was made a peer in 1837, and died November 10, 1842.—His son, **A. Degerando,** has attained some repute as a writer on historical subjects.

Degg'endorf, a town of Lower Bavaria, on the Danube, near the spot where it is joined by the Kolbach, 29 miles N.W. of Passau. The river is here crossed by a wooden bridge 1200 feet long. To one of the fine churches of the Geiersberg thousands of pilgrims yearly repair, when its 'doors of grace' are opened. The town has linen and pottery manufactories, wax refineries, and trade in cattle, fruit, and wood, and some river traffic. Pop. (1871) 5452. D. was conquered and destroyed by Ottokar II. of Bohemia in 1266, was the scene of a massacre of the Jews in 1337, suffered severely in the 'Thirty Years' War,' and was reduced to ashes in 1743 during the Austrian War of Succession.

Deglut'ition is the act of swallowing. Two stages are distinguished :—(1) The bolus of food is pushed backwards towards the anterior arch of the fauces by the application of the tongue to the hard palate. (2) When the bolus has passed between the anterior pillars of the fauces, these are closed by the contraction of two small muscles termed the *palato-glossi*, and at the same time the root of the tongue approaches the soft palate. Thus the bolus is prevented from passing forward into the mouth. The entrance to the posterior apertures of the nostrils is occluded by the closure of the posterior pillars of the fauces, the elevation of the soft palate, or *velum pendulum palati*, so that its free border touches the back of the pharynx, and by the uvula filling up the little chink or gap between the posterior pillars of the fauces. At the same time the hyoid bone and the larynx are approximated and drawn forwards and upwards by the action of various muscles, so that the root of the tongue is bent backwards and pressed, along with the epiglottis, upon the opening of the larynx. The food is prevented from entering the larynx by the approximation of the true vocal cords, and by the apposition of the epiglottis to the opening. Thus it is prevented from passing into (*a*) the mouth, (*b*) the nose, and (*c*) the larynx, and it has no way left for it but to pass into the œsophagus or gullet, into which it is propelled by the action of the constrictors of the pharynx. While the bolus is in the neighbourhood of the tonsils, it is covered over with mucus, so as to facilitate its passage. D. is a purely automatic action. To excite it a stimulus must be applied to the fauces. Once the mechanism has been set agoing, no effort of the will can arrest it. D. is also performed when the will is in abeyance, as during sleep, in profound coma, or after removal of the cerebral hemispheres. It is an excellent example of a reflex action, the centre of which is situated in the *medulla oblongata*. The sensory impressions are conveyed to the centre chiefly through the glosso-pharyngeal nerves, branches of the fifth to the fauces, and the superior laryngeal branches of the pneumo-gastric to the pharynx. The motor impressions travel along the pharyngeal branches of the pneumo-gastric, branches of the hypoglossal to the muscles of the tongue, motor filaments of the recurrent laryngeals of the pneumo-gastrics, branches of the fifth to the elevator muscles of the lower jaw, branches of the facial, and lastly, branches of the cervical plexus.

Degrada'tion, a term of English law, denoting an ecclesiastical censure by which a clergyman is divested of his holy orders. *Summary D.* is by word only. *Solemn D.* is by stripping the offender of the insignia of his office. A nobleman or knight may be similarly degraded, when attainted of treason.

Degra'ded, in heraldry, having steps or placed upon steps; said of a Latin cross, or *cross calvary*, on steps, which diminish as they rise towards the centre.

Degree', in angular measure, is the 90th part of a right angle; and, as a circular measure, is the arc comprised by two radii which make such an angle between them. A whole circumference, then, is divided into 360 degrees, each of which is made up of sixty minutes, and each minute is subdivided into sixty seconds. The French, however, have introduced the Decimal System (q. v.) here, as in all their methods of measure, a right angle being made up of 100 degrees, each D. of 100 minutes, and each minute of 100 seconds.

Degree, in music, a term sometimes used in reference to the relative position of two notes upon the staff.

Degree, University, originally implied a *licentia docendi*, or licence to teach within the university, as is still the case with the *privat-docent* of modern German universities. The modern D. is recognised by public legislation outside the university as qualifying, when other conditions are fulfilled, for the exercise of certain learned professions; but *per se* it is merely a formal statement by the university that the graduate has passed through a certain course of study, and shown a certain proficiency, ascertained by examination. The conferring of degrees and the appointment of examiners were generally in the hands of the Chancellor, who, in the case of an Episcopal city, was often the bishop or his nominee. The *licentia docendi* in the schools sometimes attached to universities was a different matter, and was often sold to incompetent persons. The earliest degrees known are probably those in Arts conferred by the University of Paris, and which, according to De Boulay in his history of that university, were introduced by Irnerius into the University of Bologna in 1150, and thence transferred to Paris. In theory all degrees are conferred by the crown, or in early Catholic times by the Pope, through the universities empowered to that effect in bulls or charters; the qualifications being ascertained by each *Faculty*, or body of teachers or graduates, who were privileged to lecture and make statutes. The first degrees given at Paris were in Arts; the inferior D. (given with a robe to the medical student of two years' standing who had passed an examination, and to the student in canon law of three years' standing) was that of Bachelor (q. v.). The term is said to have been first introduced to universities by Gregory IX., and has been extensively adopted. The names *Master* and *Doctor* at first referred indiscriminately to all teachers in the university who had obtained graduation; but later Doctor was applied to the teachers of law, theology, and medicine, and Master restricted to teachers of philosophy, classics, mathematics, &c. It was a condition of even the imperfect D. of Bachelor to read a course of lectures under some Master of the Faculty in which the D. was taken. This obligation continued when a full D. was taken; hence the phrase of 'necessary regency' or period of compulsory teaching, after which graduates, if they pleased, might become honorary regents. At Paris there was an earlier stage than that of Bachelor—viz., that of *Determiner*, who, after two years' study in grammar and philosophy, made certain declarations that he would complete the three and a half years' study required for Bachelor in Arts. The Bachelor was distinguished from the Master by a round cap, in place of the academical hood. A second period of three and a half years' study was gone through before the full D. was obtained; and there was a further ceremony by which the *magister* became a *socius* of the Faculty. At Paris, peculiar solemnity attached to the D. of 'D.D.,' fifteen years' study being necessary. At Bologna, the granting of degrees had in the 12th c. been monopolised by separate colleges of canon law, philosophy, and medicine doctors, which had each a prior, and held public examinations and conferred degrees in the cathedral. In all universities the various Faculties must have attained some degree of similar organisation. Originally at Bologna the terms *magister*, *judex*, and *doctor* merely signified, as at Paris, teacher. Later a formal admission or ceremony of *co-optation* was used, but as the unrestricted exercise of the right to admit was abused by the doctors, Pope Honorius III. decreed that all promotions to degrees should be under the superintendence of the archdeacon. The name given to the second or public examination was *conventus*; prior to which the candidate, having passed the *examen* by vote of the Faculty, was called a licentiate, having a right to lecture with the permission of the rector. Even unlicensed students might after a period of study get licence of teaching, and by an exhaustive thesis or exposition gain the title of Bachelor. Bologna is remarkable for the fact that women have there received degrees and lectured in several

subjects. The graduates had to bear the expense of the magnificent procession which preceded graduation. The *legentes* of Bologna, or those who actually lectured, correspond to the regents of other universities. In modern times, the examination generally proceeds by public examiners together with representatives of the universities. Such degrees as the Oxford B.A., M.B., and B.C.L., are obtained by fees, residence, and examinations; others, as the Oxford M.A., M.D., and D.C.L., by fees and residence. Generally, at Oxford, a certificate is required from two of the four schools of *literæ humaniores*, natural science, mathematics, and law and natural history; *literæ humaniores* being one. In Arts the public examinations are preceded by responsions; in divinity a disputation, in medicine a dissertation, and in music a composition, is generally required. At Cambridge there are a few points of nominal difference. The first examination is called the 'Little Go,' and the honours examinations are called the mathematical, classical, and moral science triposes respectively. Every D. must be signed by the Master of the College to which the candidate belongs, and before the D. is conferred by the Vice-Chancellor a grace or *supplicat* must have been obtained from the Senate. The boards of theological, legal, and medical studies control the examinations for degrees in these subjects respectively. The distinctive feature of the University of London is that it examines and confers graduation on persons who have received instruction in such institutions at home and in the colonies as have satisfied a Secretary of State with regard to their *curriculum*. This university also has and exercises a power of examining for degrees persons who have not been at any institution. At Durham degrees are conferred by the Warden and Convocation. In Scotland the *curricula* for degrees were affected at the time of the Reformation by the principles on the subject laid down in the *First Book of Discipline*, and as regards Glasgow in the *Nova Erectio*, or charter granted by James VI. Their constitution was beneficially changed by the Universities Scotland Act, 1858. At Dublin University the undergraduates are classified into junior and senior Freshmen and junior and senior Sophisters; and after taking the first D. the graduate becomes successively a junior, middle, and senior Bachelor. By payment of money, an ordinary student or pensioner may become a Fellow-commoner and associate with Fellows. The *sizars* are bursars who by examination have earned a right to enjoy their commons free.

Degree of Kindred. By the law of England, a man may not marry his mother or step-mother, his sister, his son's or daughter's daughter, his father's daughter by his step-mother, his aunt, his uncle's wife, his son's wife, his brother's wife, his wife's daughter, his wife's son's daughter, his wife's daughter's daughter. Marriages within the prohibited degrees are not merely voidable, but they are absolutely void if solemnised after passing of the Act of 31st August 1835, and the children of the connection are illegitimate. (See MARRIAGE.) The prohibition applies to relationship by Affinity (q. v.); see also AGNATE, CONSANGUINITY. A judge within a certain degree of relationship to a party to a lawsuit is disqualified from acting. See, in Scotch law, DECLINATURE. For effect of D. of K. in bankruptcy, see CONJUNCT AND CONFIDENT; in marriage, see DIVORCE.

Degrees of Latitude and Longitude. See LATITUDE and LONGITUDE.

Degrees of Lambeth. Under a statute of Henry VIII., the Archbishop of Canterbury is authorised to confer all degrees which can be given by the Universities of Oxford and Cambridge; but a degree of Lambeth does not bestow the privilege of a university degree. In former times the Pope had the power so transferred to the archbishop.

Degrees of Nobility. See NOBILITY.

De'i Gra'tia is a pious formula which has been much in favour among the dignitaries of church and state, as indicating that they hold their office or position by 'the grace of God;' from which it will of course follow that man has no right to deprive them of it. This tenure of office is still by courtesy held to be that of our own sovereigns; but 'the divine right of kings to govern wrong,' which received a rude shock at the execution of Charles I., was in England conclusively abolished at the Revolution of 1688. See DIVINE RIGHT.

Deinothe'rium. See DINOTHERIUM.

De'ism (from Lat. *Deus*, 'God') ought to mean the same thing as Theism (Gr. *theos*, 'god'), viz., a belief in God, whatever the character of the God believed in may be, and on whatever kind of evidence the belief may be based. Both words, however, have acquired special significations. Theism now means the philosophical and religious affirmation of God on grounds of natural reason: in general (as in the case of Theodore Parker and Martineau, who may be called absolute theists), on the ground of *à priori* evidence, contained in the religious and intellectual intuitions of human nature, but sometimes, as in the case of the so-called Christian theists, on the ground of the design and beneficence exhibited in nature, confirmed and enlarged by the revelation of Christ. D., on the other hand, although sometimes loosely used to express dislike or alarm, or to excite these feelings against one's opponent, has a definite historical meaning. It means the principles of the English freethinkers of the 17th and 18th centuries, who argued for natural, as against revealed, religion, and to whom Locke, Addison, Bentley, Berkeley, Campbell, Chandler, Clarke, Conybeare, Derham, Ditton, Foster, Gerard, Hoadley, Jenyns, Jortin, Lardner, Leland, Parker, Ray, West, and above all, Bishop Butler, replied. Toland, the disciple and translator of Giordano Bruno, the author of *Christianity not Mysterious* (1696), of *Amyntor*, *Nazarenus*, and the *Origin of the Jewish Nation*, &c., was perhaps the most learned and acute of the theological deists. He was expelled from the English Church. Anthony Collins, more a philanthropist than a theologian; Thomas Woolston, who was tried for blasphemy, and died in prison for resolving the Christian miracles into allegories; Matthew Tindal, the author of *Christianity as Old as the Creation*; Chubb and Morgan, the authors of various tracts which once enjoyed a great popularity, are also among the deists. Lords Bolingbroke and Shaftesbury, and in the earlier part of the 17th c. Lord Herbert of Cherbury, contributed less directly to the same school of thought. The two positions of D. are these—(1) An intellectual scepticism as regards the Christian miracles, and generally as to the value of miraculous evidence; (2) a vehement desire for *intelligible* religious truth, such as involves nothing contrary to human reason and morality. Butler's famous reply, which has always since been regarded as the mainstay of English orthodoxy, consists in admitting the objections made against revelation (which, like his follower Mansel, he holds to be essentially mysterious), and in pointing out that similar objections may be urged against natural theology, which has no miraculous evidence to support it. A generous estimate of the Deists, from the Christian point of view, will be found in Herder's *Adrastea*.

Dekk'er, Thomas, an Elizabethan dramatist, born about 1570, died probably about 1637. He was satirised by Ben Jonson in the *Poetaster*, and retorted happily in his *Satiromastix*. His plays—of which the best are *Old Fortunatus* and the *Honest Whore*—contain passages of exquisite pathos and of almost infantile simplicity and beauty. He wrote in conjunction with Webster, Ford, and Middleton, and was active as a pamphleteer. Hazlitt said he could not show his admiration for D. sufficiently, and Lamb pronounced his character of *Orleans* to be almost as poetical as *Romeo*. See Hazlitt's *Elizabethan Literature*, and Ward's *English Dramatic Literature* (Lond. 1875).

Del (*Artocarpus pubescens*), a species of tree allied to the Bread-Fruit (q. v.), a native of Ceylon, and the wood of which is employed in shipbuilding, &c.

De la Beche, Sir Henry Thomas. See BECHE.

Delabec'lea, a genus of north-eastern Australian trees belonging to the natural order *Sterculiaceæ*. *D. rupestris* is the bottle-tree, so called on account of the middle of the trunk being bulged out like a barrel. It yields a mucilaginous gum like gum-tragacanth, which is nutritious, and used by the aborigines in times of scarcity. The wood is remarkably loose in texture.

Delacroix', Ferdinand Victor Eugène, the son of the Secretary to the Council of Ancients, was born at Charenton, St Maurice, near Paris, 26th April 1799. After becoming known as an art critic, he began his career as a painter by producing in 1822 'Dante and Virgil in Hell,' the subject of which is the description in the third canto of Dante's *Inferno* of the poet's crossing

Acheron in Charon's boat. This was followed by the 'Massacre of Scio,' which commemorates Turkish cruelty in the Greek insurrection of 1822; 'Sardanapalus Dying in the midst of the Slaughter of his Wives;' 'Liberty guiding the People on the Barricades of 1830;' and, among others, two pictures on subjects taken from Scott's novel of *Quentin Durward*. A Government mission to Morocco supplied D. with the materials for his greatest colour-picture, 'The Women of Algiers' (1838). Later came 'Medea Fleeing from Jason after the Murder of Creusa;' 'Cleopatra preparing for Death;' 'A Shipwreck,' in which the crew are drawing lots for death. These are merely the leading subjects among a number and variety probably unsurpassed by any other single artist. D.'s great allegorical pictures of 'Justice,' 'War,' 'Agriculture,' and 'Industry,' on the ceiling of the Palais Bourbon, are well known. Besides many decorations of public buildings, he produced lithographic illustrations of 'Hamlet,' 'Macbeth,' and Gothe's 'Faust.' He died August 13, 1863. It is for his vehement expression and brilliant contrast of tints that D. is admired; his drawing is loose. He is considered the head of the French Romantic school of the 19th c., and he has himself described his position as opposed to that of the classical Louis David (*Revue des Deux Mondes*, July 1854). See T. Gautier's *Histoire du Romanticisme*, and C. Baudelaire's *L'Art Romantique*.

Delago'a Bay, an almost landlocked inlet on the S.E. coast of Africa, between Natal and Sofala, much frequented on account of its safe and ample anchorage. It receives the Delagoa, Manice, Machavanna, and other rivers, and its shores are low, swampy, and malarious in summer. The Portuguese have a trading settlement here, with a pop. of 10,000, mostly natives. A railway was projected between the Transvaal Republic and D. B. in the beginning of 1876.

Delam'bre, Jean Baptiste Joseph, a French astronomer and mathematician, was born at Amiens, September 19, 1749. His first work in astronomy was the construction of tables for Uranus, then recently discovered by Sir W. Herschell. His *Tables du Soleil, de Jupiter, de Saturne, d'Uranus et des Satellites de Jupiter* (1792), secured his election as a member of the Académie des Sciences; and soon after, with Méchain, he undertook the measurement of the arc of the meridian from Dunkirk to Barcelona, the results of which appeared in his *Base du Système Métrique Décimal* (1806–10). In 1807 he succeeded his friend Lalande in the Collége de France, and in 1814 published his *Traité d'Astronomie*. He subsequently wrote several histories of his favourite science during the ancient, mediæval, and modern periods, a task for which his fine scholarship eminently qualified him. D. died at Paris, August 19, 1822. See Fourier's *Éloge de D.* in the *Mémoires de l'Académie des Sciences* (t. iv.), and Dupin's *Notice sur D.* in the *Revue Encyclopédique* (t. xvi. 1822).

Delane', John Thadeus, son of William F. A. D., for many years financial manager of the *Times*, was born in London in 1817. After graduating at Oxford, D. entered the editorial department of that journal, succeeding the late Mr Barnes as editor in 1841. It is largely due to his energy, tact, and knowledge of men and of society, that the *Times* has become the most powerful newspaper in the world. D. was called to the bar in 1847, but never practised.

Delaroche', Paul, a brilliant French painter, born at Paris in 1797, was the son of a valuator of art products at the Mont-de-Piété. A pupil of Baron Gros, he struck out for himself a middle path between the romantic and classical schools. Hence he has been called the modern Eclectic, and the Casimir Delavigne of painting. His style is marked by elevation and simplicity of conception, picturesque colouring without exaggeration, and scrupulous care in details. Among his earliest pictures (1824) may be mentioned 'Vincent de Paul preaching on Behalf of Deserted Children before the Court of Louis XIII.,' and 'The Examination of Joan of Arc.' Later came 'Cromwell Looking at the Corpse of Charles I.', 'The Execution of Lady Jane Grey,' and the 'Death of the Duke of Guise.' D. spent four years in his decorative painting of the saloon of the Palais des Beaux Arts; it contains more than eighty figures of great artists of all ages in appropriate costume. Nearly all his subjects are historical: one of his latest (1851) being that of 'Marie Antoinette before the Revolutionary Tribunal,' when she made her famous appeal to the mothers of France. D., who was for many years Professor at the Fine Arts School, died 4th November 1856. See De Loménie's *Gallerie des Contemporains Illustres*, vii,

Delavigne', Jean François Casimir, a famous French lyrist and dramatist, born at Havre, 4th April 1793, was the son of a merchant in humble circumstances. Through the kindness of the Comte de Nantes, who gave him a sinecure in a public office, D. was able to cultivate his poetical taste. His pieces, *Waterloo* and the *Devastation du Musée*, better known as the *Messéniennes*, protests against the concessions granted to the Allies by the Government of Louis XVIII., made him, after Béranger, the most popular poet in France. Four dramas, *Vêpres Siciliennes*, *Les Comédiens*, *Le Paria*—suggested by Demaistre's *Lepreux d'Aoste*—and *L'École des Veillards* (played by Talma and Mademoiselle Mars), procured his admission to the Academy in 1825. The insurrectionary movements in Greece and Italy afforded him subjects for a second set of *Messéniennes;* the Revolution of 1830 inspired his splendid march-song, 'En avant! marchons contre leurs canons, à travers le fer, le feu des bataillons. Courons à la victoire!' The Polish insurrection produced *La Varsovienne* and the *Dies Iræ* of Kosciusko. His severe labour in producing his dramas of *Louis XI.* (1832), *Don Juan d'Autriche* (1835), and *La Fille du Cid* (1839), ruined his health; he died 11th December 1843. Like Béranger, D. was a thoroughly conscientious man of letters, and more than once refused the tempting offers of Charles X. His chief friend was the comic dramatist Scribe. There are numerous editions of D.'s works; that of 1845 contains a biography by his elder brother, Germain, himself a prolific writer of *vaudeville* and *opéra-comique*.

Del'aware, one of the smallest of the original thirteen states of the Union, forms part of the peninsula between the Chesapeake and the D., and has an area of 2120 sq. miles, and a pop. (1870) of 125,015. The D. river and bay bound it on the E. Much of the soil is poor and sandy. Bog-iron ore and shell marl are found, and porcelain clay abounds. In 1870 the farms were valued at $46,712,870, and their products at $8,171,667; and there were 148 woollen factories. There were (1876) 285 miles of railway. D. has a large school-fund and two colleges—Brandywine and D. College. It sends one member to the House of Representatives, and two to the Senate. Before the war D. was a slave state, and it is still noted for the antique customs of the pillory and the whipping-post for criminals. Dover is the capital, Newcastle the seaport, and Wilmington the largest town. D. derives its name from Lord De la Warr, who entered the bay in 1610. In 1627 it was colonised by Swedes and Finns, whose descendants still survive. The Dutch seized it in 1655, but gave place to the English in 1664. It formed part of Penn's colony of Pennsylvania.

Delaware River (Ind. *Makeriskiton*) rises on the W. of the Catskills in New York, and flows in a very sinuous course southward for 300 miles till it enters D. Bay. It separates New York and Pennsylvania, and further on bounds New Jersey on the E., and Pennsylvania and Delaware on the W. The upper part, between New York and Pennsylvania, presents varied and striking scenery; and southward, as the river pierces the mountains at the Water Gap, the views are unique and grand. The largest ships can ascend to Philadelphia, and steamboats to Trenton, the head of tide water.—*Delaware Bay*, into which the river enters, is 65 miles by 30, and forms a highway for vessels of every size. There is a large breakwater near the entrance, at Cape Henlopen, to protect shipping.

Delawares. See INDIANS, AMERICAN.

Deleb' Palm, a palm found in great abundance near Lake Tchad, and other portions of the interior and W. of Africa, believed to be a species of *Borassus* allied to *B. flabelliformis*, the Palmyra Palm (q. v.). The fruit is prized by the natives, who also extensively use as an article of food the tender roots produced by the young plant.

Delec'tus Perso'næ (Lat. 'choice of person'). When certain legal relationships are entered into, it is understood by law that one of the parties has some special qualification in the opinion of the other; and therefore that he who has the special qualification is not entitled to put another in his place. D. P., in Scotch law, denotes this legal doctrine. Thus under a contract

of Society (q. v.), or Partnership (q. v.), the admission of a new partner by succession or alienation is barred by D. P., unless the contract stipulates that partners are to be succeeded by their heirs, or empowers partners to assign their shares. In Scotland, a tenant under an agricultural lease, unless its term be longer than that of ordinary human life, is barred by D. P. from subletting. In leases, however short, of urban subjects there is no D. P., consequently these may be sublet, unless there is a stipulation to the contrary. See LEASE.

Delega'ted Jurisdic'tion, as contradistinguished from *proper* jurisdiction, is that which is communicated by one judge to another. Jurisdiction cannot be delegated without express power given in the grant. See DEPUTY.

Del'egates, Court of. In England, the supreme court of appeal in ecclesiastical and maritime causes was formerly constituted by a statute of Henry VIII., forbidding appeal in ecclesiastical causes to the court of Rome. The C. of D. was abolished by statute in the reign of William IV., and its functions transferred to the Judicial Committee of the Privy Council. See PRIVY COUNCIL, JUDICIAL COMMITTEE OF.

Delf (Old Eng. 'a delving') is used in heraldry to describe a block of turf or coal. A *D. tenné* is said to be the proper abatement for one who has revoked a challenge, or departed from his word. See ABATEMENT, TENNÉ.

Delft ('a canal,' from Dutch, *delven*, 'to dig'), a very ancient town of S. Holland, on the Schie, 10 miles N.W. of Rotterdam by rail, intersected in every direction by canals crossed by 69 bridges, generally of stone. It was formerly famous for its potteries, whence D.-ware is still a name for certain kinds of earthenware. Tobacco-pipes are largely manufactured. The most interesting edifices in D. are its churches. The Old Church, of the 11th c., contains the monuments of Admirals Tromp and Hein, and of Leeuwenhoek the naturalist; the New, of Prince William I. of Orange (who was assassinated at D. in 1584), and of Grotius. D. is the seat of the state arsenal, and has a new and important polytechnic school. Pop. (1877) 24,511.

Its harbour is *Delfshaven*, a town on the right bank of the Maas, 2 miles W. of Rotterdam, defended from inundations by strong dykes and flood-gates. D. has distilleries, breweries, sawmills, shipbuilding yards, and iron-foundries, and considerable shipping. Pop. (1869) 4836.

Del'hi (Moham. *Shahjehanabad*), formerly the largest and finest city of India, and the residence of the Great Moguls, now the capital of a division and district of the same name, province of the Punjab, British India, is situated near the W. bank of the Jumna, 630 miles N.W. of Calcutta, and 650 N.N.E. of Bombay, on the Punjab and Delhi Railway. It is 7 miles in circumference, and is surrounded by a grey granite wall 30 feet high, strengthened in 1803, and again in 1838, and which is pierced by four gates opening on the river, and by seven on the land side. The streets are narrow and crooked, with the exception of two, which are respectively 90 and 120 feet broad, and each about a mile long. These run from the palace, the one to the Agra gate, the other to the Lahore gate, and are both supplied with water in stone channels of red granite raised above their level; but are disfigured, like the other streets, by the occurrence of small blocks of houses planted irregularly in their centre. D. is divided into a Hindu, Mohammedan, and European quarter. The Mogul's palace, a miniature town in itself, on the water-side, surrounded by a wall of more than a mile in circumference, is one of the most beautiful monuments of Indo-Moslem architecture. This building contains the white marble Mosque of Aurungzebe, splendidly ornamented with sculpture, has an open audience-hall, also of white marble, rich in mosaic and relievos, and is embowered among beautiful gardens, in which are many fine baths and fountains. The chief building within the city is the Mosque of Shah Jehan (1631-37), famed throughout the East as the most beautiful in India. It stands on a rocky elevation of some 30 feet, and is built of marble and red sandstone. The Hindu temples are comparatively mean and diminutive. Near D. is the pyramid Kuttub Minhar, 280 feet high. In the European quarter there is the official palace, a Protestant church, the college, the arsenal, and barracks. The College of D., founded in 1792, and affiliated to the University of Calcutta, has separate departments for English, Arabic, Persian, and Sanskrit, and receives Government grants raising its revenue to £4058 yearly. In 1872-73 it was attended by thirty-six students. The chief manufactures of D. are cotton cloths, exquisite embroidery, rare gold and silver wares, and delicately carved ivory. It receives British manufactured goods, large quantities of fruits, and Cashmere and Cabul shawls for embroidering. In recent years several printing-presses have been established at D., which are producing many valuable old works, especially in Persian and Arabic. The modern D. was founded by Shah Jehan in 1631. Beyond its walls are the desolate ruins of the ancient city of the Patan kings. Pop. (1868) 154,417, of whom 71,530 are Hindus and 66,120 Mohammedans. D. is said to have been founded by a certain rajah from whom it received its name. In the *Mahabharata* it is called Indraprastha, the residence of the mythical Pandus, or Children of the Sun. D. was long occupied by native Indian kings. In 1011 it was stormed and sacked by Mahmud of Ghuzni, and in 1193 the Ghuridish Sultan Mohammed, founder of the first Afghan dynasty, made it the capital of an empire extending to Bengal. Timur took D. in 1398, but on his death followed a long period of bloodshed and anarchy. In 1450 the Lody dynasty, of Patan or Afghan origin, conquered the empire, but were displaced in 1526 by Baber, a descendant of Timur, and the first Great Mogul. D. rose to its greatest prosperity in the times of Akbar and Aurungzebe. It was taken and plundered by Nadir Shah (1738), after which it never recovered its splendour. The British under Lord Lake captured the city, and relieved the Emperor from the tyranny of the Rohillas and Mahrattas, October 16, 1803. During the Mutiny it was seized by the Sepoys, May 11, 1857, and after a siege of seven days, was retaken on the 20th of September.—The *district* of D., which lies between the Ganges and the deserts of Multan, is only in parts well irrigated and fertile, and has an area of 1273 sq. miles, and a pop (1868) of 621,675, of whom about three-fourths are Hindus and one-fifth Mohammedans.

Delict' and **Delin'quency.** The law of Scotland, following that of Rome, divides delinquencies, as grounds of civil claim for reparation, into *delicts* and *quasi delicts*, the former being offences committed with criminal purpose, the latter being offences arising from gross negligence. Offences belonging to the latter class do not, like the former, always afford ground for criminal prosecution, as well as for action for Damages (q. v.), but they very often do. See CRIME, CULPA, DOLE.

Deli'lah (Heb. 'the languishing'), a courtesan mentioned in Judges xvi., and famous in connection with Samson (q. v.).

Delille', Jacques, a French poet and professor, was born at Aigues-Perse, in Auvergne, June 22, 1738. He was educated at the Collége de Lisieux, Paris, and finally became Professor of Belles Lettres in the university of that city, was presented by the Comte d'Artois with the revenues of the abbey of Saint-Severin (30,000 livres a year), went to Constantinople in 1784 in the suite of the Comte de Choiseul-Gouffier, became Professor of Belles Lettres in the university of Paris on his return, lost his fortune and nearly his life at the Revolution, and quitted France for Switzerland after the Reign of Terror, but returned in 1801, and resumed the duties of his chair. He died May 1, 1813. D.'s finest work is his charming translation of Virgil's *Georgics* (1769). Besides this he produced many elegant, harmonious, and felicitous poems of a didactic and descriptive character, of which the finest are *Les Jardins* (1774), *L'Homme des Champs* (1800), and *La Conversation* (1812). A complete edition of D.'s works was published in 1824 (new ed. 2 vols. 1844).

Delir'ium (Lat. from *delirare*, 'to wander in mind,' *de* and *lirare*, 'to go out of the straight line in ploughing;' 'to err, wander, go wrong'), a state of mind in which the ideas are wild, irregular, and unconnected, or do not correspond with the truth or with visible external objects. D. may be caused by whatever tends to disturb the healthy functions of the brain, and is a frequent symptom of a great variety of diseases and injuries. It varies in intensity from mild incoherence to the most exalted forms of frenzy. Injuries of the cranium, morbid growth within its cavity, diseases of the brain-tissue and its vessels, and serous effusion may result in D. It is also caused by the action of poisonous ingredients in the circulation, and is a common symptom of fevers and several acute diseases. Violent mental excitement, either of a depressing or elevating nature, may give

rise to an attack of acute mania. D. is also frequently caused, more especially in the case of females, by reflex action from the terminal distribution of the nerves, as during pregnancy, lactation, and by the disturbance arising from uterine diseases, and, in some cases, from pain alone. D. is not a disease *per se;* so that the treatment to be adopted is not uniform, but must depend upon the nature of the disease with which it is associated, and of which it is a symptom.

Delirium Tremens is a form of delirium accompanied with tremors or trembling, principally of the hands and arms. This condition may be a symptom of organic disease of the brain or nervous system, of apoplexy and sun-stroke. It is occasionally caused by excessive and prolonged mental excitement from overwork of the brain in connection with literary pursuits, business, speculations, gambling, and such like; or it may be the result of certain acute diseases which act on the nerves or nerve-centres, as fevers, or of accidents and surgical operations followed by shock. In such cases it is sometimes called *delirium nervosum.* The term D. T. is generally applied to such cases as are caused by the excessive abuse of alcoholic stimulants, and the disease may be produced by a single but prolonged debauch, or by a long-continued course of dissipation. In the former case it depends on blood-poisoning from alcohol; and in the latter there is, in addition, saturation of the brain substance, and admixture of the serum of its ventricles with alcohol. Alcohol is absorbed directly by the blood-vessels, without change or decomposition, and passes rapidly into the circulation, acting as a direct poison upon the nervous tissues through which the infected blood circulates. It is cumulative in its action, and has been detected, by analyses, in the blood, urine, bile, the fluid of serous membranes, the brain substance, and the liver. The long-continued presence of alcohol in the brain results in organic disease of that organ; and D. T. depends on the effect produced on the nervous centre, the pathological changes being, in some instances, softening; in others, induration of the cerebral or cerebellar substance with increase of the sub-arachnoid serum. There is also steatomatone degeneration of the small arteries of the brain, causing atrophy of its convolutions and also œdema. The nerve substance of the brain becomes poisonously affected, resulting in a permanent loss of cerebral power. The disease is sometimes called *delirium è potu*, or *delirium ebriositatis.*

The symptoms of D. T. are both mental and physical, and the following, which are the more prominent, are invariably present. There is great agitation and loss of control of the mental functions, and of certain muscles of the body. In addition to delirium, more or less vivid, there is a morbid anticipation of impending danger, with hallucination and spectral illusions, rendering the patient dangerous to himself, as he may endeavour to leap out from a window to escape from imaginary foes in pursuit of him. In the early stages the patient is usually coherent when the attention is fixed, but incoherent when left to his own thoughts. In the later stages there is incessant muttering delirium. The prominent physical symptoms are, loss of control over certain of the voluntary muscles; the tongue, when protruded, is tremulous; there are convulsive movements of the extremities; the hands and arms tremble, and shake, so that it is impossible to hold a pen or convey a cup of liquid to the mouth; there is also, frequently, *subsultus tendinum*, and complete deprivation of voluntary motion. There is, generally, sleeplessness; but when sleep is procured it is accompanied with frightful dreams, and, when awake, the ocular spectra have the most horrible and repulsive forms.

The treatment proper for such cases consists in the stoppage of the stimulant which has been the cause of the malady, the judicious administration of opiates to calm the nervous system and procure sleep, nourishing articles of diet, and the gradual elimination of the poison. One attack leaves the brain permanently weakened, and predisposes to a second; and repeated attacks result in a state of fatuity or death. The only safety, therefore, consists in total abstinence from alcoholic stimulants.

Delisle, Rouget. See LISLE, ROUGET DE.

Delitzsch′, an old town of Prussian Saxony, on the right bank of the Löbber, 15 miles N. of Leipzig, with which it is connected by railway. It has manufactures of woollen cloth, hosiery, and tobacco, and several important annual fairs. Pop. (1871) 8111.

Deliv′ery. See PARTURITION.

Delivery of a Deed. While a deed or writing remains in the custody of the granter or of his agent, never having been delivered, it is not binding. To make it so, it must have been delivered either to the grantee or to a third party; when put into the hands of a third party, the legal presumption seems to be that it has been delivered to him unconditionally for behoof of the grantee, but this presumption may be overcome.

Dell′a Crus′can School, a name adopted by certain English residents at Florence, who began about 1785 to publish affected, frigid, and silly verses in two English daily newspapers. Their effusions produced a host of imitators, equally fluent and equally intolerable, and the journals were flooded by verses in the style of Pope's *Song by a Person of Quality.* This literary nuisance was at length abolished. Horace Smith ridiculed it in the *Rejected Addresses;* and Gifford, in his *Baviad* (1794) and *Mæviad* (1796), extinguished the pestilent versifiers as completely as the follies of the Hôtel de Rambouillet were extinguished by Molière.

Dell′ys, a seaport in Algeria, 49 miles E. of Algiers, identified by Bartle with the *Rusucurrium* of Pliny. The climate is healthy, and the vine and olive flourish. D. has trade in grain, oil, and salt, and is the chief mart of the Kabyles. Pop. (1872) 2257.

Delolme′, Jean Louis, was born in 1740 at Geneva. He became an advocate, but had to fly to England on account of the political opinions expressed in his *Examen de Trois Parts des Droits.* D. published his *Constitution de l'Angleterre, ou État du Gouvernement Anglais comparé avec la Forme Républicaine et avec les autres Monarchies de l'Europe*, at Amsterdam, in 1771, and his English translation in 1772. After suffering great poverty he returned about 1775 to Switzerland, where he died, July 16, 1806. Beside the *Constitution de l'Angleterre*, a sensible though superficial book, once popular, but no longer considered an authority, D. wrote a *History of the Flagellants* (1782), *An Introduction to Defoe's History of the Union*, and *Observations on the Window-Tax.*

Delorme′, Marian, one of the great courtesans of French history, was born about 1612 near Châlons-sur-Marne. Going to Paris, and making no attempt to live virtuously, she won numerous lovers by her beauty, while her fondness for intrigue led her to take an active interest in the politics of the time. She espoused the side of the *Frondeurs*, and incurred the hostility of Mazarin, who was even on the point of throwing her into prison, when she died, at the age of thirty-nine. Long after this event, a curious report got afloat, and was widely believed, that she had escaped to London, returned to Paris, and after marrying three husbands, lived to the age of 129. D. is the subject of one of Victor Hugo's most powerful dramas.

De′los, called also Ortygia, Cynthus, &c., the central isle, and the smallest, of the Cyclades in the Ægean Sea. According to the common Greek myth, D. appeared on the deep at the stroke of the trident of Poseidon (hence its name), and was fixed by Zeus to afford a resting-place for Latona, as she fled from the wrath of Herè on the eve of the birth of Apollo and Diana. The island was originally inhabited by Ionians; was the seat of an Amphictyonic Council, and the centre of the worship of Apollo, whose festival was celebrated here with unusual splendour. Its sacred character was respected by the Persians, and in 477 B.C. it was chosen as the seat of the treasury of the confederacy against Persia. It was purified by the Athenians, 426 B.C., when all tombs and human remains were removed from it, and it was declared pollution for a dog to enter, or for a human being to be born or to die on the island. Four years after, deeming the purification incomplete, the Athenians banished all the inhabitants also. The bronze and bronze vessels of D. were famous. After the destruction of Corinth by Mummius, 146 B.C., D. became a great commercial centre, and it continued to flourish till the Mithridatic war, when it was pillaged and crippled beyond recovery. Numerous fragments of marble structures lie scattered over the island; the remains of the temple and colossal statue of Apollo may still be traced, but the architectural glories of D. were carried off centuries ago to adorn Venice and Constantinople.

Del'phi, a town of Phocis, situated in the vale of the Pleistus, and enclosed behind by a rocky barrier, through a cleft in which issues the Castalian spring, was famous as the seat of the oracle of Apollo. The original name of this oracle was Pytho, and the sanctuary was at first superintended by the town of Crissa. On its decline D., whose population had come from the Dorian town Lycoreia, became an independent state, and through the oracle rose rapidly in influence and wealth. Its affairs were administered by the noble families of the town; and whenever the oracle was to be consulted, the Pythia took her seat upon a tripod, placed above an opening in the ground, in the centre of the temple of Apollo, through which arose an intoxicating smoke. This smoke so affected the Pythia's brain that she became delirious, and in that state gave utterance to sounds that were believed to express the reply of the god to those who had come to consult the oracle. The answers still extant are generally in hexameter verse and in the Ionic dialect. The Pythia was a native of D., in early times a maiden, but subsequently always above fifty years, and generally taken from some family of poor country people. Innumerable benefactors loaded the shrines with gifts, and even in the 8th c. B.C. the fame of the oracle was widespread. The first celebration of the Pythian Games took place in B.C. 586. In B.C. 548 the temple was destroyed by fire, and was rebuilt at a cost of £115,000 sterling. In succeeding centuries it was frequently plundered—as, for example, by the Phocians at the time of the Sacred War, by Sulla, and by Nero. The oracle was closed in the general extirpation of pagan rites by Theodosius. The site of the ancient town is now occupied by Castri, a wretched village.

Delphinap'tera, a genus of *Cetacea* or Whales, belonging to the Dolphin family (*Delphinidæ*), and represented by such forms as the *D. Peronii*, or the 'right whale porpoise' of the S. Seas, by the *D. Commersonii*, by *D. borealis* of the N. Pacific, and by other species. The species of this genus have no dorsal fin, and have the jaws prolonged to form a rostrum or beak, flattened from side to side. The first-mentioned species averages five feet in length. Numerous teeth exist.

Delphin Classics, an edition of the Greek and Roman classics, chiefly edited by Huet, tutor to the Dauphin, son of Louis XIV., for the use of his pupil—'in usum Serenissimi Delphini.' Thirty-nine eminent scholars aided in the preparation of the work, which is now, however, of little value. Valpy's *Variorum Latin Classics* (in 141 vols. Lond. 1819-30) contain the Delphin notes and *Interpretatio.*

Delphin'idæ and **Dolphi'nus**. See DOLPHIN.

Delphin'ium. See LARKSPUR and STAVESACRE.

Del'ta, in geology, the name given to the roughly triangular space—resembling the Greek letter Δ (delta),—formed near the mouth or estuary of a river by the dividing of its main channel. The apex of the triangle points up the river, and marks the point at which the division takes place. A D. land is the great receptacle of the detritus or debris brought down by the river, and hence it frequently occupies hundreds of sq. miles covered with alluvial soil, and with vegetable and other matters. The D. is frequently extended seawards by increasing deposits of the river. Deltas occur most typically in lakes and tideless seas, such as the Mediterranean. D. formations are of the highest interest to the geologist, as explaining, in some aspects at least, the process of coal formation and other allied points.

Del'uge, The, as commonly understood, is the flood which drowned the whole human race but Noah and his family. The biblical narrative, literally interpreted, requires us to believe that this was a flood which covered the whole earth, and so it was always understood till the increasing light of science and criticism revealed the objections to such a belief.

The chief of these are the smallness of the ark, the present distribution of animals on the globe, the varieties of human language, the ash-cones of extinct volcanoes, which, older than the supposed time of the flood, could not have been touched by it, the quantity of water required, the necessary destruction of most marine animals, as well as all in the ark, owing to the change of climate, and of freshwater fish and plants by the water, &c.

For a time it was thought that all these difficulties were avoided by supposing merely a partial D. But this question has been entirely superseded by recent Assyrian discoveries, which appear to show that the Hebrew record is only a national form of a widespread Semitic legend. The Babylonian version just discovered points in the direction of a solar myth. It is on a tablet, which is one of twelve, containing myths corresponding to the months of the year and the signs of the zodiac, and all relating to a solar hero, Gisdubhar. The story of the flood is on the eleventh, corresponding to the month called in Accadian 'the rainy,' our January, over which Aquarius presided. See Smith's *Assyrian Explorations and Discoveries* (1875), and *Chaldæan Account of Genesis* (1876).

Delun'dung (*Linsang gracilis*), a genus of Carnivorous mammalia inhabiting Java and Malacca, and belonging to the *Viverridæ* or Civet-cat family. It is allied to the genus *Viverra* itself, but differs from the civets in having a very slender body, long legs, and elongated 'whiskers.' It does not possess any scent-pouches. Its colour is greyish, with four broad saddle-shaped bands of brown crossing the back. The sides are variegated with brown, the legs are spotted, and the tail encircled with alternate brown and grey rings. The muzzle is pointed. The D. is by no means common, and its habits have not been thoroughly ascertained.

Delvi'no, a fortified town in the vilayet of Janina, Albania, European Turkey, the seat of a Greek bishop, with olive plantations in the vicinity, and a trade in oil and other local produce. Pop. (1873) 7500.

Demand' and Supply'. It is a question among political economists whether, as a rule, the demand for anything creates the supply, or whether the supply precedes the demand. We shall endeavour to answer the general question by considering the two following questions as illustrative:—1. Does the earth produce wheat because men want bread, or do men eat bread because the earth produces wheat? 2. Do men wish to travel fast because locomotives have been invented, or were locomotives invented because men wished to travel fast.

In the production of wheat there are two concurrent agencies—human hunger and the natural power of the earth for producing wheat. If we must determine which is antecedent, we must certainly hold the earth to have had power either of producing wheat or other fruit capable of sustaining human life before human life came. Finding wheat good and nutritious, the natural supply is augmented by art and industry. In answer to the second question, it is plain that the demand—that is, for speedy passage from one place to another—is antecedent to the supply; locomotives not being the produce of the earth, but of human ingenuity. Human necessities and wants are the demand, supply is the result of this force acting on human ingenuity and on the physical capability of our planet; and if the capability to sustain life had not preceded it, then life could not have been. These forces act and react on one another.

Adam Smith has shown that it is the man who saves money, not the man who spends it, who adds to the wealth of his country. Plainly the more wealth a man produces, or is the means of producing, and the less he consumes, the richer does he become; and what is true of the individual is true of men collectively; but while demand is the force which, acting on capability, produces supply, consumption is, in most articles, a necessary concomitant of demand. Thus, were men to cease from *drinking* wine, but to continue buying it, there would be a continuous accumulation of the wine—that is, so much accumulation of wealth; but then, if they ceased to drink the wine, they would certainly cease to buy it, and production would stop and wealth diminish.

Dem'avend, Mount, an extinct volcano, on the borders of Irak-Ajemi and Mazanderan, Persia, 18,600 feet above the level of the sea. It is the loftiest peak of the Elburz chain, is conical in form, and the top is entirely composed of a soft rock from which sulphur is dug. At its base there are several hot springs. D. in Persian tradition occupies a place corresponding to that of Etna in the myths of Greece.

Dem'bea, Lake of, in the plateau of N. Abyssinia, lies 6000 feet above the level of the sea, is about 150 miles in circumference, and studded with cultivated islands. It receives and discharges the waters of the Blue Nile.

Dembin'ski, Henry, a Polish general, born near Cracow, January 16, 1791, joined the Polish army in 1809, shared in the French invasion of Russia, and distinguished himself at the

battle of Leipsic in 1813. After the fall of Napoleon he returned to Poland, was appointed commander of a brigade in the Polish revolution of 1830, and shone conspicuous at the battles of Leiv and Kuflew. After his repulse of the Russians on the Narar, and his able retreat through Lithuania in 1831, he was made general of the Polish forces. When Warsaw surrendered, D. took refuge in France, visited Egypt in 1833 in the expectation of a war with Russia, in 1849 transferred his services to the Hungarians against Austria and Russia, and was made general of the Hungarian army by Kossuth. After the defeat of Kapolna and resignation of Kossuth, D. fled to Turkey, and returned to Paris in 1851, where he died, June 13, 1864. See D.'s *Mémoires sur la Campagne de Lithuanie* (Strasb. 1832) and *D. in Ungern*, by A. H. Danzen (Lond. 1875).

Demen'tia. See INSANITY.

Demera'ra, a river of British Guiana, with a northerly course of 200 miles, falls into the Atlantic at Georgetown, where it is nearly two miles broad. Its embouchure, though obstructed by a bar, furnishes a spacious harbour, and the river is navigable by ships of considerable burden for nearly 100 miles.

Demesne' (Old Fr. *demaine*, Lat. *dominium*, 'lordship'). Lands next to the lord's mansion, and which he kept for the support of his household, were in old times called the D. In our day it denotes the right of an owner of land in Fee Simple (q. v.). See also DOMESDAY BOOK.

Deme'ter. See CERES.

Demet'rius, the name of three kings of Syria.—1. **D. Soter,** grandson of Antiochus the Great, spent his early years at Rome as a hostage, whence he fled, partly through the help of Polybius, when twenty-three years old, and established himself on the throne of Syria. He conciliated the senate and secured his recognition as king, but acted so despotically towards his neighbours, that the Jews under Judas Maccabæus took up arms and defeated his general. D. fell in battle (B.C. 150) against an impostor named Balas, whose claims were supported by the Romans, the Jews, and Attalus, King of Pergamus.—2. **D. Dicator,** son of the preceding, after remaining in exile for some years, recovered the kingdom from Balas by the assistance of Ptolemy Philometer, but the infant son of Balas being set up as a pretender against him, D. lost Antioch and a great part of Syria, and withdrew to Babylon. His army was soon after destroyed by the Parthians, and himself taken prisoner (B.C. 138). After a captivity of ten years he was re-established on the throne, but his soldiers and subjects having become disaffected, he was assassinated at Tyre, B.C. 125. —3. **D. Eucærus,** grandson of the preceding, held with his brother for a time the whole of Syria. War, however, broke out between the brothers, and Philip, having blockaded D. in his camp, compelled him to surrender at discretion. He remained in honourable captivity with Mithridates, King of Parthia, until his death. His coins bear date from 218 to 224 of the era of the Seleucidæ, *i.e.*, from 94 to 88 B.C.

Demetrius, or **Dmitri,** son of Ivan IV. ('the Terrible'), Czar of Russia. On his father's death, in 1584, D. was exiled by Boris Godounof to Ouglitch, and there died. The authorities proclaimed that he had killed himself in an epileptic fit, but the people believed he was assassinated by Boris, who usurped the throne in 1598, on the death of Fedor, Ivan's other son. The unpopularity of the usurper at length prompted a succession of romantic deceptions. Four persons came forward, two of whom declared themselves to be the son, and two the grandson of Ivan.

The *first* pseudo-D. appeared in 1603. He was a servant of Prince Adam Wizniowiecki, and was aided by his master, by the Palatine of Sandomir, and by Sigismund III., King of Poland. Boris had grown unpopular; and though he declared this D. to be an apostate monk, called Grishka Otrepiev, had to yield in 1604. D. ruled wisely, but his marriage with Marina, daughter of the Palatine, and his Polish leanings, cost him the throne. He was slain at Moscow in 1606, in a riot stirred by Prince Vassili Shuiski, who became Czar.

The *second* impostor appeared in 1607, declaring himself to be D., and that he had escaped from the Moscow riot. He is said to have been really a Jew, but was accepted by Marina as her husband, and found supporters. He was put to death in 1610. A like fate befell the *third* pseudo-D., who pretended to be the son of the first. The *fourth*, who did the same, was executed at Moscow in 1613. These false Demetriuses have formed a favourite theme for poets and novelists; a dramatic fragment by Schiller deals with one of them. See Prosper Mérimée's *Episode de l'Histoire de Russie.*

Demetrius, Phalereus, so called from his birthplace at the demos of Phalerus, was 'the Admirable Crichton of his time, the last of Attic orators, statesman, poet, and warrior.' D. was born B.C. 325, educated at the school of Theophrastus, and in B.C. 317, on the death of Phocion, placed by Cassander over the administration of Athens, which he conducted for ten years with so much success, that the Athenians erected no fewer than 360 statues in his honour. Success, however, rendered him reckless; and on the approach of Demetrius Poliorcetes to Athens, B.C. 307, D. was compelled to flee. He lived for many years at the court of Ptolemy Lagi at Alexandria, and it is believed that by his influence the foundation was laid of the famous Alexandrian Library. The successor of Lagi sent D. into exile in Upper Egypt, where he died about 283 B.C. His works, which are enumerated by Diogenes Laertius to the number of fifty, have all perished.

Demetrius Poliorcetes. See ANTIGONUS.

Dem'i, or **Dem'y** (Fr. 'a half'), in heraldry, the upper, front, or dexter half, as a *D.-lion-rampant.* D. usually, but not always, indicates the dexter half *per pale* in inanimate objects.

Demi-Bas'tion, in fortification, a half-bastion, consisting of one face and one front, and usually terminating the faces of a crown-work or horn-work.

Dem'idoff, a celebrated family of Russian capitalists, founded by **Nikita D.,** born a serf in Peter the Great's time. He amassed enormous wealth, first by the manufacture of arms, and then by Siberian iron-foundries, which he first established in 1699. He was raised to the rank of a noble in 1720, and left two sons, one of whom, **Akinfij D.,** worked still more extensively the metals of the Ural range, and established the iron-works of Nijni-Tagilsk, still the greatest in Siberia. In recognition of his labours and riches he was made Counsellor of State. See Spasskij, *Shisneopisanie Akinfija D.* (Petersb. 1833).—**Procopij D.** (died 1786), son of the preceding, founded the School of Commerce at Moscow, which was removed to St Petersburg in 1800.—**Paul Grigorjevich D.** (died 1821), nephew of Akinfij, was the founder of the D. Museum at Jaroslavl.—**Nikolaj Nikititch D.** (born 1774), nephew of the preceding, was both soldier and author. He raised a regiment against the French in 1812, and did good service. He died in 1828, and two years later his works were published at Paris under the title, *Opuscules d'Economie Politique et Privée.*—**Anatoli D.,** son of Paul, was distinguished as a literary man, a savan, and a philanthropist. Both Russia and other countries, especially Italy, in which he long resided, owe to him many useful educational and charitable institutions. A translation of his *Travels* was published at London in 1853. D. married Princess Mathilde, daughter of Jerome Bonaparte, in 1840, but their union was dissolved five years after. D. possessed one of the most splendid art collections in Europe. He died at Paris, 29th April 1870.

Demi-Lune, in fortification, a work composed of two faces, forming a salient angle towards the outside of the fort, and intended to cover its curtain or wall, as well as the shoulders of the adjoining bastions. It is surrounded by a ditch, and has two demi-gorges near the counterscarp. See LUNETTE, RAVELIN.

Demir'-Hissar' ('iron castle'), a fortified town in Roumelia, European Turkey, 46 miles N.E. of Salonica, with less than 3000 inhabitants. It takes its name from an old fort which crowns the hill at the foot of which it is built.

Demise', in English law, is the term applied to the conveyance of an estate in fee, or for life, or a term of years.

Demise of the Crown. By the law of England the sovereign never dies; for on the death of the reigning monarch the royal dignity vests, and the kingdom is *eo instante*, in legal language, *demised* to the heir to the crown.

Dem'isem'iquaver, in music, a note of which the duration is half that of a semiquaver, or one-eighth that of a crotchet. See NOTATION.

Dem'iurge (Gr. 'a workman,' lit. a workman of the *demos*, or people), according to the Gnostics (q. v.), was the creator of the world. All the Gnostics maintained a twofold creation: one evolved directly out of the Divine essence, and another produced by God's plastic power out of pre-existing matter—the framer of the latter lower creation not being the author of the higher world of animation, but the D., a being far inferior to the supreme God. Some believed the D. to be the representative of the supreme God on this lower stage of existence, and the highest of all emanations from his substance; others regarded him as absolutely hostile to God, and identified him with Jehovah, the God of the Jews. See Neander's *Kirchengeschichte*.

Demmin', a town in the province of Pommern, Prussia, lies in the valley of the Peene, 75 miles N.W. of Stettin. It consists of D. proper, which is walled, and three suburbs; has manufactures of woollens, linens, hosiery, leather, and tobacco, distilleries and breweries, and a trade in corn and malt. Pop. (1871) 9050. D. is one of the oldest Slavic towns of Pommern, and as early as the time of Karl the Great is mentioned as an important seat of trade. In the fierce struggles between the Teutonic and Slavic race, that occupy a good part of the middle ages, D. suffered severely, and again in the Thirty Years' War.

Democ'racy is a Greek word meaning the power or rule of the general body of the people, not of the mob or poorest classes. Thus at Athens there was a D. as distinguished from the tyranny of a noble family, and the oligarchy of a wealthy, priestly, or military class. But the Athenian D. did not contain the *metœci*, or the slaves. Nor among the free citizens who enjoyed the various political franchises and discharged the political duties was there complete equality of rights, any more than equality of conditions. The Solonian Constitution, as much as the Servian Constitution at Rome, recognised classes of citizens, whose rights, or some of them, were measured by their property. The degree in which the *demos* participates in the government of itself, directly or indirectly, is, however, not so fundamental a question as this—On what principle is the Government conducted? It is of course humanly possible that even a despot could be found of sufficient intelligence and benevolence to ensure the happiness of the great mass of his subjects. But this is not sufficient for permanent security. The despot dying, either his son or an elected successor would reign, or there would be a revolution. In any event, there would be no indisputable record that government was to proceed according to the ascertained interests of the many; there would be no free constitution. Hence the argument of democrats is, that by the universal experience of history it has been found that constitutions in which the mass of the people has no power, direct or indirect, except the extremely indirect menace of revolution, have tended to the exaltation of the family or class having power, and to the debasement and the denial of rights of the unenfranchised, unrepresented class. This is generally conceded, and hence the idea of representative government—viz., that the people are to govern themselves. In modern times the business of government has become so multifarious, and so much of it is intrusted to local machinery by the permissive system, that the argument for D. as a means of elevating the moral tone and developing the mental energies of the people is very powerful. The great dangers of D. are a low grade of intelligence in the representative body, and in the popular opinion which controls it, and class legislation. This has always been a real difficulty in human affairs. No doubt one policy reconciles all the legitimate interests of a nation, but a social class may be as grievously in error about its own interests as about the interests of another class; it may even forget the interests of all other classes, and identify itself with the nation. These chances are increased when a class is not only numerically the strongest, but intellectually and morally the weakest. The commonest method of preventing these evils is the restriction of the suffrage to those whose material position is supposed to guarantee in some measure their moral and intellectual fitness for the franchise. Such a restriction rests on deeper grounds than the constitutional maxim, 'No representation, no taxation;' the unenfranchised must depend on the patriotism of those who represent the enfranchised. But D., as frequently practised, is unequal in favour of the predominant class which happens to be enfranchised. In all constituencies (which are not framed on a logical plan, but, as burghs, counties, &c., are the result of historical growth), very often only a numerical majority is represented, but the minority is never represented. Hence a vote of delegates returned on this principle may represent the wishes of an actual minority of the nation. The necessity of a representation of minorities is partly concealed by the fact that nowhere is the suffrage extended to all men and women in the area of voting. Another plan suggested for use in Great Britain is that of the three-cornered constituency, by which a minority, equalling or exceeding a third of the constituency, would be able, if it attempted no more, to return one out of three members, the voters having only two votes. Mr Garth Marshall has advocated the cumulative vote, which has been successfully worked in recent school-board elections. Such plans, however, leave untouched the case where a minority is made up of several constituencies. The most comprehensive suggestion on the subject is that of Mr Thomas Hare. He takes as his unit of representation, not equal electoral districts (the plan which is being largely adopted on the Continent), but the quota of electors reached by dividing the enfranchised population by the number of seats. Every candidate obtaining that quota would be returned, and every elector would be entitled to vote for all the candidates in an order of preference, his vote being counted for only one (Hare's *Treatise on the Election of Representatives*). This system of personal representation, as it is called, would entirely supersede the necessity of what have been called *fancy franchises*, viz., privileges of voting conferred on bodies who are supposed to have special intelligence or special interests to protect. The objections which have been made to it are chiefly practical: the suspicion to which the central office for analysing the votes would be exposed; and the risk of the American 'ticket' system, or mass-voting on a prepared list, being introduced. The fallacy consists in supposing that the entire voting would be revolutionised by a device which has for its object the special organisation of minorities. Mr Hare's plan is in operation in Denmark (where it had been thought out independently by M. Andrae). It would probably be necessary to limit the number of secondary or contingent votes to be given. But so many strong beliefs and entire schools of thought are unrepresented by the present system, that probably some form of personal representation will ere long become general.

Democ'ritus, a celebrated philosopher, born at Abdera, in Thrace, about 460 B.C., disciple of Leucippus, travelled extensively in quest of knowledge, and after spending his inheritance, returned home in great poverty. He visited Babylon and Meroë, spent a considerable time in Egypt, and even, according to some, reached India and Ethiopia. He was a man of upright character, of great modesty and disinterestedness, and of such immense diligence and acquisitiveness, that he excelled in range of knowledge all the earlier Greek philosophers. For his worth and wisdom his fellow-citizens greatly honoured him; while his sterling merit is said to have secured for him even the good opinion of the arch-scoffer Timon, whose tongue spared no man else. According to a tradition, he put out his eyes that he might pursue his studies unmolested; but it is much more likely that he lost his sight by severe application to study. From his irresistible inclination to look at the comical side of things, and to laugh at human follies, he acquired the name of 'the laughing philosopher.' He studied and wrote on physical science, mathematics, grammar, music, and philosophy; but only a few fragments of his voluminous writings remain. D.'s system of philosophy was an expansion of the atomic theory of Leucippus—that the universe, material and mental, consists of minute, indivisible, and impenetrable atoms. These atoms he assumes as the ultimate ground of nature; necessity as the cause of all existence. In other words, he ignores design, but admits the reign of law. Gods and men are alike the aggregates of atoms. This theory was adopted by Epicurus and ardently advocated by Lucretius. Inward peace, a conscience without reproach, freedom from fear and passion, he considers as the ultimate objects of human endeavour. D. died about 357 B.C. A good collection of the fragments of his writings was published by Mullach (Berl. 1843).

Dem'odex, a peculiar genus of mites (*Acarina*), represented by the species *D. folliculorum*, which inhabits the sebaceous follicles of the human skin, especially near the nose. This parasite is of minute size and thoroughly harmless.

Demoiselle, the name of a species of Crane (*Scops*, or *Anthropoides virgo*), sometimes known as the Numidian crane.

This bird occurs in Africa, Asia, and E. Europe. Its graceful movements have procured for it its French sobriquet. Its height is about 3 or 3½ feet. The colour is a bluish-grey; the ear-tufts are white, and the head itself is a deep black colour. The breast has a tuft of deep iron-grey plumes, and the secondary feathers form a prominent upper tail, which droops over the primaries and tail-feathers. The nostrils are narrow. To this genus the Stanley crane (*S.* or *A. paradisæus*) of the E. Indies also belongs. The name D. is also given to the *Libellulidæ* or Dragon-Flies (q. v.).

Demoi'vre, Abraham, a mathematician, known best by the formula in analytical trigonometry which bears his name, was born at Vitri in Champagne, May 26, 1667, but passed most of his life in England, where he had taken refuge after the revocation of the Edict of Nantes. The appearance of Newton's *Principia* stimulated his mathematical studies, and he soon acquired a high reputation in the science. An intimate friend of Newton, Leibnitz, and Bernouilli, he was nominated by the Royal Society to decide the famous controversy between the first two. D. died at London, November 27, 1754. His chief works are his *Miscellanea Analytica* (1730), *Doctrine of Chances* (1716, 1738, 1756), *Annuities on Lives* (1724, 1740, 1750), and several memoirs in the *Philosophical Transactions.*

Demoli'tion, the art of destroying a structure, is part of the professional education of a military engineer. Under this head he is taught how to destroy works and buildings; what quantity of gunpowder is required to blast masonry of a given thickness; how to determine the line of least resistance; and similar matters in military operations.

Demo'niacs, persons believed to be possessed by Demons (q. v.). It was the popular belief of the Jews (except the Sadducees) at the time of Christ, and of many other nations centuries before, that demons, especially the spirits of bad men, entered the bodies of men to torment them. It was believed that a man's soul could go in and out of his body during sleep, and also that demons could be drawn in with the breath, of which yawning and sneezing were proofs. Along with this there was the belief that diseases were due to supernatural causes; a belief which had two phases: first, that diseases, pestilences, &c., were due to the anger of God (2 Sam. xxiv. 15); and secondly, according to dualistic ideas (see DEVIL), that these were the work of the devil and his agents. So firm a hold had this belief on the human mind, that it was not till the 17th c. that it even began to be checked by writers on medical science. From the fusion of these two beliefs resulted a firm conviction that those diseases especially which were more mysterious in their symptoms, as insanity, epilepsy, St Vitus's dance, dumbness, &c., were caused by demons who had their abode in the persons afflicted.

In the New Testament Christ is represented as 'casting out demons;' and as science now finds it difficult to recognise in the manifestations of the infirmities of D. any evidence of a superhuman cause, except in the sense in which all things are *originally* of divine origination, various interpretations of the cures have been offered, of which the most rational is that the language used concerning them represents the popular belief, probably that of the evangelists too, who looked at the phenomenon only from a *religious* point of view, and is therefore not to be interpreted as inculcating scientific knowledge. After all has been said that can be said on the scientific side, it remains credible that physical evil had its primary origin in *sin*, and sin—apart from personality—is a meaningless term.

De'mons (Gr. *daimones,* 'divine intelligences,' 'deities') are evil spirits; but that they are exclusively evil is peculiarly a Christian notion. By pagan writers the word was applied to every order of beings superior to man, or was confined to the inferior deities, or to a class of beings between gods and men, some of whom were benevolent and some malignant. The dualistic idea (see DEVIL) of the Indians, Persians, Egyptians, &c., was not known to the Israelites in the earlier stage of their religious development. Jehovah was the author of all evil as well as all good (Isa. xlv. 7). The plagues and disasters, and even the temptations of men, were all the work of God and his angels (Exod. vii. 3; 2 Sam. xxiv. 1). In the apocryphal books the influence of Persian and Alexandrine ideas is unmistakably apparent in the increasing abundance of good angels and their development into a hierarchy, and perhaps even more plainly in the belief in wicked spirits. The earliest form of the belief that these were *fallen* angels appears in the Book of Enoch. Satan by this time had a distinct kingdom and a residence in the subterranean hell, from which tens of thousands of fiends constantly streamed obedient to his behests. Their favourite haunts were deserts and wildernesses, but there they grew weary, and as they wandered about finding no rest, their great resort was to take up their abode in a human body. See DEMONIACS.

In the New Testament there is distinct reference to a hierarchy of evil spirits as well as of angels (Eph. vi. 12, &c.); and the figurative language of St Paul (1 Cor. x. 20), in speaking of the heathen gods as devils, perhaps led to the theory of later writers that they were literally D. At any rate the whole heathen Pantheon was transformed into a Pandemonium. The belief in a parallelism between the powers of light and the powers of darkness also multiplied devils to match the multiplication of saints. These holy men were continually assailed by them, but were uniformly able to vanquish them by the sign of the cross, a drop of holy water, or an appeal to the Virgin. The period including the 13th and four succeeding centuries has been called 'the devil's own,' from the extent to which the belief in evil spirits then prevailed. Every destructive or terrifying phenomenon of nature, every pain or disease which afflicted man or beast, every accident, the most trifling as well as the most serious, all were the work of the devil, his imps, or his agents. (See WITCHCRAFT.) In a book published about the middle of the 16th c., giving the popular notions regarding the infernal hierarchy (Weir's *Pseudomonarchia Dæmonum*), seventy-two princes are named, and their subjects estimated at 7,405,926 devils. See Ukert's *Uber Dämonen, Heroen und Genien* (Leips. 1850); Roskoff's *Geschichte des Teufels* (Leips. 1870); Lecky's *History of Rationalism in Europe* (1865); Maury's *Histoire de la Magie* (Par. 1860); Farrar's *Life of Christ* (1870).

Demonstra'tion (Lat. *demonstrare,* 'to point out'), in mathemathics or logic, is the process by which a result is shown to be a necessary consequence of pre-established premises.

Demonstra'tion, an exhibition of military force to check or deceive an enemy, and by causing a division of his troops, to weaken him at a point where the real attack is intended.

De Mor'gan, Augustus, the son of Colonel De M. of the Madras army, was born on the island of Madura, near the coast of Java, June 27, 1806. He entered Trinity College, Cambridge, in 1824, and took his B.A. degree as fourth wrangler in 1827. In 1828 he was elected Professor of Mathematics in London University, an office resigned in 1831, but resumed in 1836, and held till his death, March 18, 1871. His extensive knowledge, combined with his clear, logical, and, when necessary, sarcastic style of writing, rendered him a powerful controversialist. He has written a treatise on almost every branch of pure mathematics, on arithmetic, algebra, trigonometry, probabilities, &c., and his *Differential and Integral Calculus,* published by the Society for the Diffusion of Useful Knowledge, is the most complete treatise on the subject ever produced in England. His numerous articles in the Penny Cyclopædia make up nearly one-sixth of the whole twenty-seven folio volumes. His *Budget of Paradoxes,* which originally appeared in the *Athenæum,* is full of quiet chuckling humour. His treatment of the most celebrated claimants to the discovery of perpetual motion and the squaring of the circle is particularly delightful.

Demos'thenes, the greatest orator of antiquity, and one of the noblest characters in history, was born in the Attic borough of Pæania, B.C. 385. When he came of age, he prosecuted his guardians for their mal-administration of the property bequeathed by his father, and, after much delay, obtained a verdict against them, with ten talents (£2400) damages. Stimulated by his loss of fortune, and encouraged by his success in the courts, D. devoted himself to a public career, and assiduously strove to overcome the physical disadvantages of his feeble constitution and stammering speech. In B.C. 358, Philip of Macedonia commenced the attack on the northern allies and possessions of Athens, which was his first step towards the overthrow of the liberties of Greece. The unflinching and patriotic, though unsuccessful, opposition of D. to the Macedonian aggression is embodied in his famous orations against Philip, the first of which was delivered B.C. 352; and in the three Olynthiac orations he endeavoured to avert the

fate of Olynthus, which fell before Philip, B.C. 348. The peace of Philocrates followed, from the benefits of which the unhappy Phocians were basely excluded, and Philip passed Thermopylæ. Notwithstanding the opposition of Athens, he became a member of the Amphictyonic League, and steadfastly pursued his plans for the subjugation of Greece. He was elected general-in-chief of the Amphictyonic army in B.C. 339, and, in the next year, Greek independence was completely destroyed in the disastrous battle of Chæroneia. Æschines, the rival of D., and the leader of the Macedonian party in Athens, endeavoured to prove the illegality of the proposal of Ctesiphon, that D. should receive a crown in recognition of his noble public career; and D. triumphantly replied in an oration that has been justly ranked as the masterpiece of ancient eloquence. The death of Philip, B.C. 336, and of Alexander, B.C. 323, afforded delusive grounds of hope to the Greek patriots; and on the latter event, D. was recalled from the exile into which he fled when punished for his alleged protection of the rebel Harpagus. The Macedonian power, however, was still in the ascendant. Antipater marched to Athens, and D. fled to the temple of Neptune, in the island of Calauria, where he took poison, and died, B.C. 322.

Demot'ic Alphabet. See HIEROGLYPHICS.

Demot'ica, a town in the vilayet of Adrianople, province of Rumili, European Turkey, 22 miles S. of Adrianople, with manufactures of silks, woollens, and pottery. It is defended by a citadel, and contains a palace, in which several Sultans resided before the Turks captured Constantinople. Karl XII. of Sweden found an asylum here for some time after his defeat at Pultowa. Pop. estimated at 10,000.

Dem'pster, Thomas, a learned professor and voluminous writer, was born at Muiresk, Aberdeenshire, about 1579, and educated at Aberdeen and Cambridge, whence he repaired to France. Here he assumed the title of Baron of Muiresk, and obtained a professorship in the College of Beauvais, which was afterwards exchanged for one at Nîmes. Repairing to Italy, he taught first at Pisa and afterwards at Bologna and at Butri, in the neighbourhood of which he died, September 16, 1625. The best known of D.'s works is his *Historia Ecclesiastica Gentis Scotorum* (1627), which, though in some respects a valuable and learned work, is justly discredited on account of its deliberate falsehoods and misrepresentations. A reprint was made for the Bannatyne Club in 1829.

Demul'cents (Lat. *demulceo*, 'I soften') are medicines for internal use, taken for the purpose of lubricating the mucous membranes when these are inflamed. D. are given for inflammation of the stomach, the air passages, and the urinary organs. Examples—Mucilage, marsh mallow, and linseed tea.

Demurr'age (from the Fr. *demeurer*, Lat. *demorari*, 'to delay'), in mercantile law, is the allowance paid by the exporter of goods to the owner of the vessel, when it is obliged to wait for goods beyond her *levy* or *running* days (days allowed to load or unload a ship), either before or after the voyage, or while she is waiting for a convoy. During loading or unloading, the risk of delay lies with the freighter; after loading or unloading, it is with the shipowner. Rate per day of D. is usually stipulated for in the charter-party.

Demurr'er, an English law-term, denoting a legal difficulty which must be determined by the court before an action can go further. A D. therefore is an issue on a point of law. It concludes an allegation, but denies or questions the inference sought to be drawn from it.

Demy', a size of paper frequently referred to. For printing paper it measures 22½ inches by 17½; for drawing, writing, and account-book papers, 20 by 15½. D. blotting-paper is 22½ inches by 17¾.

Denain', a town in the department of Nord, France, on the left bank of the Scheldt (here navigable), and 6 miles W. of Valenciennes. It occupies the centre of a coalfield, and coal and iron are extensively raised. D. has several blast-furnaces. Pop. (1872) 10,430.

Den'ary Scale. See NOTATION.

Denar'ius (Lat. *deni*), the principal silver coin among the Romans, was first coined B.C. 269. It originally contained ten, and afterwards sixteen *asses* (see As), and was in value equivalent to about 8½d.

Den'bigh (Welsh *Din-bach*, 'little fortress'), the capital of Denbighshire, near the centre of the vale of the Clwyd, 30 miles W. of Chester. It is situated on the sides and at the base of a limestone hill, which is crowned with a ruined castle, built in 1284 by Henry de Lacy, on the site of one still more ancient. D. consists mainly of one street. There is a free grammar school (1727), an orphan school for 55 girls, founded in 1860 with funds left in 1540, and a new church, St. Mary's (1875), built at a cost of £11,000. Leather, wool, shoes, and gloves are manufactured. D. unites with Ruthin, Holt, and Wrexham in returning one member to Parliament. Pop. (1871) 6323.

Den'bighshire, a maritime county of N. Wales, having the Irish Sea on the N., Flint, Chester, and Salop on the E., Caernarvon on the W., and Montgomery and Merioneth on the S.; length, 41 miles; average breadth, 17; area, 613 sq. miles; pop. (1871) 105,102. Its general character is mountainous, but in the N. there are some level tracts, and the vales of Llangollen, of the Conway, and of the Clwyd are noted for their beauty and fertility. On the hills sheep, ponies, and goats are reared; barley, oats, and potatoes are grown on the uplands; and the valleys produce heavy wheat and pulse crops. In 1867 238,593 acres were under cultivation; 67,837 under corn crops; 17,415 under green crops; 35,357 under clover and grasses in rotation, and 111,051 under grass not in rotation. The chief mineral products are coal, iron, slates, lead, and copper. The county returns two members to Parliament. D. possesses numerous British remains of the Roman period or earlier, as tumuli, barrows, forts, &c. To later times belong Offa's Dike, and Watt's Dike, which runs parallel to it on the E., works consisting of a ditch, with forts at intervals, and constructed to protect the English of Mercia from the irruptions of the Welsh.

Den'derah (the *Tentyra* of Strabo, and the Coptic *Tentarî*, Thy-n'-Athor, *i.e.*, the abode of Athor, a contracted form of Aphrodite), a ruined town of Upper Egypt, on the left bank of the Nile, celebrated for its temple, the best-preserved structure of its kind in the land. It was dedicated to Athor, and its oldest portion dates from the period of the later Ptolemies. It contains sculptured portraits of Cleopatra and her son Cæsarion, and the names of the Cæsars from Tiberius to Antoninus Pius (A.D. 14–161). It is 220 feet long by 50 broad, and has a portico (erected by Tiberius) supported on twenty-four columns, ranged in four rows, with quadrangular capitals. On the ceiling of the portico is the sculpture called by the French savans the zodiac of Tentyra, which seems to represent mythological and emblematic figures. A smaller sculpture of mythological figures on the ceiling of one of the lateral chambers was, in 1821, by the permission of Mehemet Ali, cut out by M. Lelorrain, and brought to the Paris Museum. Other buildings were a temple of Isis and a Typhonium, all enclosed with a brick wall, in some parts 35 feet high and 15 feet thick, forming a square with a side of 1000 feet.

Den'dermonde ('the mouth of the Dender;' Flem. *Termonde*), a town in the province of E. Flanders, Belgium, at the confluence of the Dender and the Scheldt, 18 miles E. of Ghent by rail. It has a citadel built in 1584. The church of Notre Dame contains two pictures by Vandyke. Principal manufactures, woollens, lace, pottery, &c. Pop. 8300. By opening sluices of the rivers, D. compelled Louis XIV. to raise the siege in 1667, but it was taken by Marlborough in 1706, and again by the French in 1745.

Dendrer'peton (Gr. 'the tree-lizard'), a genus of fossil and extinct Amphibians, belonging to the order *Labyrinthodontia*, and found within the trunks of *Sigillariæ* (q. v.), or certain fossil trees in Nova Scotia. The genus is founded on several small bones discovered in a *Sigillaria* trunk, two feet in diameter, and wholly converted into coal. D., according to Owen, shows affinities with *Archegosaurus* (q. v.), from the plicated structure o the teeth, the sculpturing of the cranial plates, and the relations, size, &c., of the bones of the limbs.

Den'drite (Gr. *dendrites*, having the property of a *dendron* or tree), the name applied to the hydrous oxide of manganese, occurring in limestones, trachytes, and other rock-substances,

and which from its peculiar branching or plant-like crystallisation is sometimes mistaken for fossilised plants and mosses.

Dendrograp'sus, an important fossil genus of *Hydrozoa* (q. v.) or Zoophytes, exclusively found in the Upper Cambrian and Lower Silurian rocks. The species of this genus have been referred by palæontologists to the modern order of the *Sertularidæ* (q. v.), or 'sea-firs,' as well as to the extinct order of the *Graptolitidæ*, or Graptolites (q. v.). *D. Hallianus* is a familiar species, and exists in the form of a plant-like organism, springing from a stout footstalk, which was probably attached to some fixed object, like our modern zoophytes. The branches bear on one side a series of cups or *cellules*, resembling the 'thecæ' of living sea-firs, each of which cups must have contained a little *polypite*, or single member of the zoophytic colony. In D. the cups, like those of graptolites, partially overlap each other.

Den'drolite (Gr. 'tree-stone'), a general term applied to the fossilised trunks of trees, characteristic more especially of the Carboniferous age. The trees belong to various groups of the vegetable world, but chiefly to the acrogenous and endogenous divisions of the plant kingdom. Since the more intimate study of fossil botany or *Palæophytology* has been undertaken, fossil plants of all kinds have been directly referred to their respective groups; and the use of such collective and general terms as D. is now greatly done away with.

Dendrophyll'ia, a genus of compound *Sclerodermic* (q. v.) corals belonging to the *Zoantharia Sclerodermata*, and ranked among the 'deep-sea' corals and reef-building forms. The species of D. derive their name from their branching tree-like shape. *D. nigrescens* is a familiar species. It is regularly branched, possesses deep cells, and the tentacles of the polypes are cleft or divided in a longitudinal manner. It is found in the tropical seas.

Den'drophis (Gr. 'tree-snake'), and **Dendroph'idæ**, a genus and family of Colubrine (q. v.) snakes, so named from their habit of frequenting trees. In this family, which occurs in Africa and S. America, the body is long and slender, five-sided, and the upper jaw is larger than the lower. The *scuta* or head-shields are long and regular, and the scales are narrow. *Bucephalus* and *Ahætulla* are familiar genera.

Deneb', a brilliant star of the first magnitude, in constellation Cygnus, forming with Vega and Polaris an evident right-angled triangle. Near it is the small double star 61 Cygni, interesting as having a large proper motion, and being one of the nearest stars to our system—according to Bessel 650,000 times more distant than the sun is from the earth.

Den'gue [*Kisuaheli*, E. African, from *ki-dinga*, the prefix *ki* being the diminutive or personal form. The term *dinga* is now obsolete in E. Africa, except as the designation of this disease; and as such, it is used with the word *pepo*, an evil spirit. 'D.' or 'Denge' is a Portuguese form of the E. African term *kidinga-pepo*, signifying a disease marked by the sudden accession of cramp-like pains, which are supposed by the natives to be caused by an evil spirit]. *D. scarlatina rheumatica* has been defined as 'a peculiar febrile disease conjoined with sudden severe pains in the small joints, which swell, succeeded by general heat of skin, intense pain in the head and eyeballs, and the appearance of a cutaneous eruption on the third or fourth day.' D. has occasionally appeared as an epidemic disease in the E. and W. Indies, the Southern U.S., the ports on the Gulf of Mexico, and even as far N. as New York. In America it is called the *Break-bone Fever*, and was epidemic there in 1824-28, 1847, 1850, and 1860. The disease has probably been derived from E. Africa in connection with the slave trade. D. has never appeared as an epidemic in Europe. The latest epidemic of D. broke out at Zanzibar in 1870, and spread thence over Arabia, India, and China along the lines of human intercourse. D. is usually accompanied with obstinate constipation. Quinine has no influence over the disease, except during the febrile stage, but the exhibition of iodide of potassium is attended with the most favourable results. The disease has been described by Drs Twining, Mouat, and Goodeve, and more recently by Dr Christie of Zanzibar (*Trans. of the Med. and Phys. Soc.*, Bomb. 1871).

Den'ham, Sir John, an English poet, was the son of the Chief Baron of Exchequer in Ireland, and was born at Dublin in 1615. After an education at Cambridge, he studied law in Lincoln's Inn. In 1641 his tragedy of *The Sophy* appeared, and was hailed with plaudits which are now as forgotten as the play itself. *Cooper's Hill*, a pleasant descriptive poem still worth reading, was produced in 1643. Previously to the Restoration D. had to leave England, but his later life was prosperous, and spent in the King's service. He died 10th March 1668. Pope's praise has made D. a permanent name in English literature; and those to whom the smooth vigour of *Cooper's Hill* is quite unknown still remember the line—

'Where Denham's strength and Waller's sweetness join.'

Deni'al, in law, imports no more than *not confessing*. It does not amount to a positive assertion of the falsehood of that which is denied. See CONFESSION, CONFESSION AND AVOIDANCE, CONFESSION, JUDGMENT BY.

Deni'na, Carlo Giovanni Maria, a well-known Italian historian, was born at Revello, in Piedmont, February 28, 1731. He studied at Turin, and in 1754 was appointed Professor of Humanity at Pignerolo, but lost his seat by writing a comedy which offended the clergy. Subsequently D. was appointed Professor of Rhetoric in Turin University. This office he lost by giving provocation to the monks in his *Discorso sull' Impiego delle Persone* (Flor. 1777), and being banished from Italy, he went, in 1782, on the invitation of Friedrich the Great, to Berlin. There D. lived and wrote till 1804, when Napoleon appointed him his librarian. D. died at Paris, 5th December 1813. He was the author of numerous works, mainly historical. Among the chief of these are *Delle Rivoluzioni d'Italia* (3 vols. Tur. 1769-70); *Essai sur la Vie et le Règne du Frédéric II.* (3 vols. Berl. 1790-91); *Storia dell' Italia Occidentale* (6 vols. Tur. 1809-10). D. also wrote a heroic poem, *La Russiade* (Berl. 1799-1800), in honour of Peter the Great. See Rifiessi, *Memorie sopra la Vita et le Opere di Carlo D.* (Parma, 1799).

Denis, St, a town in the department of Seine, France, on the rivulets Croud and Rouillon, 6 miles N. of Paris, and within the outer line of the fortifications. The Abbey Church, built by Dagobert I. on the site of the chapel that covered the remains of St D., became the mausoleum of the kings of France. The National Convention decreed its destruction in 1793, when its tombs were rifled, and the royal dust thrown ignominiously into ditches. Napoleon I. commenced its restoration, which was completed by successive governments, with so much care that it is now one of the most splendid ecclesiastical structures in France. The crypt contains statues of the French kings from Hlodwig to Louis XVI. St D. has dyeworks, printfields, bleacheries, flour-mills, and chemical works, and an active inland trade. Pop. (1872) 28,810.

Denis, St, or **Denys, St**, the patron saint of France, the founder of the Gallican Church, and the first Bishop of Paris, was a Christian missionary who came from Rome to Lutetia (Paris) in 251, where, after making many converts, he was martyred by command of the Roman governor, Pescennius. His body was taken from the Seine by a heathen lady, Catulla, who became a Christian, and buried the saint in her garden, on the spot where the Abbey of St D. (q. v.) now stands. D. has been confounded with Dionysius the Areopagite (q. v.). The *Acts of St D.* are a forgery of the 7th or 8th c. *Montjoye St D.*, was long the war-cry of France. See De Launoy's *De Duobus Dionysiis*.

Den'izen (Old Fr. *deinzein*, one who is *deins*; Mod. Fr. *dans*; Lat. *de intus*, 'from within,' *i.e.*, 'the city') is an alien born who has obtained letters of denization, which entitle to purchase and transmit lands, though not to inherit them. The right to grant letters of denization is a prerogative of the crown. See ALIEN.

Deniz'li, a town of Asiatic Turkey, vilayet of Aiden, 100 miles S.E. of Smyrna, has many large bazaars, and some manufactures of leather (morocco), silks, articles of dress, &c. Pop. 10,000.

Den'mark (Dan. *Danmark*), the smallest of the three Scandinavian kingdoms, in the N. of Europe, embraces the peninsula of Jutland, and the islands Seeland, Moen, Fünen, Laaland, Falster, Bornholm, &c. It is bounded N. by the Skagerak, an inlet of the North Sea, E. by the Cattegat, the Sound, and the Baltic, S. by Slesvig, and W. by the North Sea. Its lat. extends from 54° 32′ (Gjedserodde, the S. point of Falster) to 57° 45′ N. (Cape Skagen in Jutland), and its long. from 7° 47′ (Blaavandshuk, 'the horn,' on the W. of Jutland) to 12° 37′ E. (Helsin-

gor or Elsinore, on the Sound). The divisions, areas, and populations are as follows :—

	Area in sq. miles.	Pop. 1874.	Capitals.
Amts in the Islands.			
Copenhagen	216	271,700	Copenhagen.
Roeskilde	257	32,700	Roeskilde.
Frederiksborg	522	83,300	Helsingor.
Holbæk	677	90,100	Holbæk.
Sorö	569	87,200	Sorö
Prästö	644	100,100	Prästö.
Bornholm	225	33,000	Rönne
Maribo	641	92,400	Maribo.
Odense	471	83,600	Odense.
Assens	254	43,100	Assens.
Svendborg	634	117,800	Svendborg.
Amts in Jutland.			
Hjörring	1,072	95,400	Hjörring.
Thisted	651	63,300	Thisted.
Aalborg	1,134	91,300	Aalborg.
Viborg	1,179	87,800	Viborg.
Randers	939	100,300	Randers.
Aarhuus	306	60,000	Aarhuus.
Skanderborg	650	72,300	Skanderborg
Veile	902	107,400	Veile
Ringkjöbing	1,748	79,300	Ringkjöbing.
Ribe	1,175	68,900	Varde.
	14,807	1,861,000	

The great island groups lie to the S.E. of Jutland, and in the entrance to the Baltic. By far the largest island is Seeland, separated from the Swedish coast by the Sound (*Ore Sund*, 'Ear Sound,' from its shape), which narrows to 24 miles at Helsingor. In the Sound are the islands Amager and Saltholm, and to the S. of Seeland lie Moen, Falster, Laaland, and several of smaller size. The Great Belt passes between Seeland and another group, consisting of Fünen (*Fyen*), Langeland, Arró, Taasinge, &c. To the N. of the Fünen group are the islands Hesselo, Seieró, Samsó, Hjelm, Thuno, and Endelave, and to the N., in the Cattegat, Anholt, Läso, and Hirsholm. These islands have generally rugged, rocky coasts, and are pointed in a southerly direction. Some 95 miles E. of Seeland is the solitary island of Bornholm. D. has an entire coast-line of 3855 miles. Copenhagen (q. v.) is the capital, and chief among the other towns are Aarhuus, Randers, Odense, Roskilde, and Helsingor. The foreign possessions of D. are the Faroe Islands, Iceland, Greenland, St Croix, St Thomas, and St John in the W. Indies.

General Aspect.—The surface of mainland and islands alike is singularly flat, and is elevated but little above the level of the sea. The greatest heights in Jutland are Himmelsberg (530 feet) near Silkeborg, and Eiers-Bavnehöi (522 feet), in a central sandy range forming the watershed between the N. Sea and the Baltic, and terminating in the extreme N. in Cape Skagen, or Skagen's Odde. In the W. of the peninsula there are stretches of sandy heath (*dunes*) and swampy morass, alternating with more or less fertile parts. The E. is a rich corn-land of fine valleys, with here and there forests of beech, elm, birch, alder, and pine. Seeland is also well wooded, and in the S. is very productive. D. is richly watered by small streams, of which the most important are the Guden-Aa (87 miles), entering the Baltic Sea near Randers, and the Ribe-Aa, Varde-Aa, and Stor-Aa, flowing into the North Sea. There are numerous lakes, as the Arre, Fure, Esrom in Seeland, and the Fiil, Tastum, Lang, Juul, Mos See, &c., in Jutland, none of which are of any great depth or size. The coast is greatly indented, and is generally sandy and shelving; the inlets, or fjords, occasionally form good harbours. In the N. of Jutland, Hjorring and Thisted have been insulated by the Lymfjord breaking through the isthmus Harboöre-Tange into the North Sea (in 1825). The principal inlets besides the Lymfjord are the Isefjord in the N. of Seeland, the Odensefjord or Stegestrand in Fünen; and on the E. of Jutland the Mariagerfjord (20 miles long), the Randersfjord (15 miles), the Horsensfjord (10 miles), and the magnificent Veilefjord, which can admit ships of war. The Lymfjord, which is the most extensive of these arms of the sea, varies in depth from 27 to 53 feet, and sends off several branches, as the Aggersund, Skivefjord, Hjarbukfjord, Feggesund, Vilsund, &c. It contains the islands Mors, Fuur, Livö, Oland, &c., and its waters, which are saltish, are subject to a regular tide. The W. coast of Jutland is one of the most dangerous in the world to shipping, owing to its shifting sandbanks and frequent mists (*Havgusen*). In the N. it forms the expansive Bays of Tannis and Jammer, and further S. is broken by the Lymfjord, Nissumfjord, Stadilfjord, and Ringkjöbingfjord. The most northerly of the N. Frisian islands, Fanö, Mano, &c., which belong to D., lie off the coast of Ribe.

Climate, Geology, Botany, &c.—The climate of D. is somewhat severer than that of Britain, but milder than that of N. Germany. It is free from violent extremes. From March to September winds from the W. and N.W. prevail; during the other five months S.W. and W. are the most common winds. The cold piercing N.W. wind, which, in the beginning of the year, sweeps over the N. of Jutland and along the W. coast, is called the Skai. For about one-fifth of the year (69 days) the sky is quite clear; in winter the W. districts are frequently shrouded in thick mists. In the course of the year Copenhagen has 157 days of rain, and a fall of 23 inches; Ringkjöbing on the W. coast of Jutland has 200 days and a fall of 29½ inches. The former of these places is fairly representative of the rest of D., and has a mean temperature of 31°·1 F. in winter, 43°7 in spring, 63°·5 in summer, and 49°·1 in autumn. With the exception of Bornholm, which is partly covered with volcanic rocks, like the adjoining coast of Sweden, D. consists almost entirely of Tertiary formations. Chalk comes to the surface in Moen, in the S. of Seeland, and in many parts of Jutland. D. is singularly devoid of minerals. Bornholm yields annually some 40,000 tons of an inferior coal, but peat is the fuel in general use. Blue marble, sandstone, and potters' clay are found in various parts. On the W. coast of Jutland there is a slight yield of amber. The subsoil usually consists of layers of dark-blue clay (*blaalaer*), or beds of peat-moss. On several of the islands the clay is of a reddish colour, being mixed with fine sand. It is generally rich in vegetable remains, but contains no trace of large land animals. The upper soil contains much sand, and is often of a fine gravelly nature. In the islands and in parts of Jutland there are tracts of rich marshy loam, composed chiefly of bituminous marl. D. is on the whole a fertile country. In 1874 a total of 4422 sq. miles were under cultivation, while 674 were covered with wood, and 5567 were in pasture. Some three-fifths of the inhabitants are engaged in agriculture. The most productive parts are Möen, Lolland, Falster, Seeland, and Fünen; the W. of Jutland has been greatly improved by assiduous cultivation during the last twenty years. In 1871 the amount of oats produced was 1,017,222 bushels, of barley, 834,944, of rye, 800,915, of wheat, 156,815, and of potatoes, 117,805. There is also some production of hemp, lint, and tobacco. In the S. of Seeland, Moen, and Fünen gardening is a favourite occupation, and the chief fruits produced are apples, pears, cherries, &c. The indigenous vegetation is almost identical with that of N. Germany.

Zoology.—The wild animals of D. have almost entirely disappeared since the decline of the large forests. The wild boar, however, still exists, and among the animals that abound are the deer, the polecat, the fox, the hare, &c. All the ordinary domestic animals of Europe are reared successfully. Jutland has a celebrated breed of horses, admirably adapted for light cavalry. Great attention is paid also to the rearing of horned cattle. In 1873 the number of horses exported was 7088, and of cattle 71,256. Of birds, the chief are the eider-duck, wild-goose, partridge, thrush, and snipe. The Lymfjord abounds in swans. From 60,000 to 70,000 men are engaged in the fisheries, and among the fish caught are the turbot, torsk, salmon, herring (*stromming*), mackerel, cod, flat-fish, and eels. Along the E. of Jutland occur large oyster-beds.

Industries and Commerce.—As might be expected from the comparative absence of coal and iron, the manufactures are few and of no great importance. As a rule, the peasantry are self-supplied with the ordinary articles of clothing and furniture. Copenhagen is the chief seat of the manufactures, which are mainly silks, cottons, leather, porcelain, tobacco, and chemicals. Randers is the centre of the glove industry, and Tondern is noted for its lace. There are also large breweries, distilleries, paper-factories, sugar-refineries, &c. D. has an admirable position for commerce, lying in the great trading highway of N. Europe. Its trade is chiefly with Germany, Great Britain, Sweden, Russia, Brazil, France, the United States, and the W. Indies. The principal exports are cattle, prepared meats, grain, flour, hides, leather, and gloves; imports, coffee, raw metals, coal, worsted, and cotton goods, oilcake, dye-stuffs, sugar

raw tobacco, and timber. In 1874 the total value of the exports amounted to £9,578,912, of the imports to £12,920,768. The number of foreign ships that entered the ports of D. was 21,278, of 933,320 tons, while the merchant navy of D. embraced 2846 vessels, of 212,608 tons.

Railways and Finance.—In the absence of good roads the railway system in D. is of greatly increased importance. It now (1876) extends throughout Jutland to Aalborg and Frederikshavn in the N., and is connected with the Slesvig-Holstein Railway, while Funen, Seeland, and Falster are also traversed by lines of various lengths. In 1875 there were in all 636·6 miles of railway, and 1584·4 miles of telegraph lines, transmitting 762,609 messages. There are also many important canals. The budget revenue for 1875–76 was £2,550,481; the expenditure, £2,506,508; and in the same year the public debt amounted to £11,153,811. The cental system of coinage was adopted on the 18th of January 1875. Of this system the unit is the *öre*, of which 100 make a *krona* (crown), 18 of which are equal to the English pound sterling. The English *ton* has also taken the place of the old *taëst* as the unit of tonnage.

Government, Army, and Navy, &c.—According to the Liberal constitution of June 5, 1849, D. is governed by a hereditary monarchy, and by a National Assembly or *Rigsdag*. Executive power is vested in the king and his responsible ministers. The Rigsdag is composed of two Houses—the *Landsthing*, a body of sixty-six representatives of the better classes, of whom twelve are chosen for life by the king, the others being elected for eight years; and the *Volksthing*, consisting of some hundred members (one to every 16,000 of the inhabitants), elected for three years by universal suffrage. During the annual session of the Rigsdag, a financial budget is submitted by the ministry. The Rigsdag appoints four assistant judges to the Supreme Court (*Höiesteret*), which sits in Copenhagen, and which admits appeals from all the lower courts. Civil cases are tried primarily before courts of conciliation, composed of persons of local position and influence. Since the reforms of 1867 all subjects of the kingdom above twenty-one years of age are liable to regular military service for eight years, and for other eight years in the reserve. Exemption is allowed, however, on payment of certain sums. In 1875 the army consisted of 35,975 men and 1031 officers, with a contingent raising it to 52,656 on a war footing. The principal fortresses, besides the capital, are Kronborg, Nyburg, and Fredericia. The navy consists (1875) of 33 vessels (7 iron-clads) of 23,470 horse-power and 314 guns.

Ethnography, Religion, and Education.—The Danes belong to the Scandinavian branch of the Teutonic family. They are a strong, muscular people, with regular features, light hair, and blue eyes. In disposition they are patient and plodding, and are rather distinguished for sincerity and sense than for wit or sprightliness. The established religion is Lutheran, but complete toleration prevails. The Reformed religion, to which the king must adhere, was introduced in 1536. There are seven bishops, who are nominated by the king. In 1874 there were of other creeds 4290 Jews, 1857 Roman Catholics, 2128 Mormons, 3223 Baptists, &c. Education is compulsory for children between the years of seven and fourteen, and the system is in many other ways admirable. Every adult in the kingdom is said to be able to read and write. The number of state or parish schools is over 2600, while there are also 16 lyceums, many academies, and 6 training colleges for teachers in the public schools. Besides the university (founded 1478), with its 51 professors and 1200 students, the capital has a military high-school since 1830, an academy of agriculture, with 16 professors, and an art academy (10 professors), founded in 1843.

History.—It is probable that some part of Jutland was the original home of those Cimbri (q. v.) who, along with the Teutones, ravaged Gaul and threatened Italy in the time of Marius (113–101 B.C.). At any rate, the peninsula was known to Roman writers under the name of the *Chersonesus Cimbricus.* Of this prehistoric period there are many interesting remains, as tumuli, cromlechs, &c., which have been carefully examined by the antiquarians of N. Europe. From the S. of Jutland, as well as from the N. of Germany, came those Saxons, Angli, Frisians, and Jutes, who, in the 5th and 6th centuries, invaded and possessed the island of Britain. Their numerous emigrations, extending over more than a hundred years, greatly depopulated the peninsula, into which now poured the Danes, who had hitherto been restricted to Seeland and part of the Swedish coast. These new-comers subdued the whole mainland as far S. as the Eyder on the Saxon border, and formed among themselves a group of 'gaus,' or states, ruled by petty kings (*smaà kongar*), one of whom, Gottrik or Gottfried, even ventured to make war on Karl the Great (804–810). In 826 Ansgar (q. v.) entered S. Jutland with the news of Christianity. Gorm, the Old, rose against the new faith, and succeeded in conquering the territories where it had taken root before his death in 936. His son, Harald Blaatand ('Blue-tooth'), did homage to the German Emperor Otto I., was converted to Christianity (965), and made Norway a fief of the Danish crown. The old Odin worship maintained a footing in D. for 200 years longer, and its later heroes were fabled in the Kæmpeviser (see DANISH LANGUAGE AND LITERATURE) and the Eddas (q. v.). England was completely conquered by Knud (Old Eng. Cnut), a grandson of Gorm, who died 1035. Civil war, which had meantime been disturbing D., was stamped out by Valdemar I. the Great (1157–82), and his son Knud VI. (1182–1201) subdued Holstein and Pommern. Valdemar II. added to the kingdom Lauenburg, Mecklenburg, and Esthonia. Erik, Valdemar's eldest son, was killed in battle (1250) by his brother Abel, who made himself Duke of Slesvig or S. Jutland, and later King of D. (1326–30). Valdemar IV. Atterdag (1340), granted Slesvig in fief to the Duke of Holstein (1386). (See SLESVIG-HOLSTEIN.) His daughter Margaret (q. v.), a great queen, wife of King Hakon of Norway, conquered Sweden (q. v.) in 1389, and left the three Scandinavian kingdoms to be ruled by her favourite grand-nephew, Erik of Pommern. The three countries, bound together by the Calmar Union, 20th July 1397, were soon lost by Erik. The Swedes achieved independence in 1448, and the Danes in the same year raised Christian of Oldenburg, a descendant of the old royal line, to the throne. Christian I. (q. v.), who founded the long line of Oldenburg, was also chosen by Norway, 1450, and by Slesvig-Holstein, 1460. From Christian II. (q. v.), 'the Wicked' (1503–23), the crown was transferred to his uncle Frederik I., who again united D. with Norway and Slesvig-Holstein (1523–33). Christian III. (q. v.), son of Frederik (crowned 1536), united Slesvig-Holstein in perpetuity to D., codified the laws in the 'Recess of Kolding,' and introduced the Reformation (1536), but had little control over the lawless nobility. Frederik II. (1559–88) fought against Sweden for seven years, and Christian IV. (1588–1648) also made a vigorous effort to hold the kingdom together, which was partly frustrated by the arrogance of the nobles. Under Frederik III. (1648–70) the Swedish possessions were seized by Karl X. (1657), and the fiefdom of Slesvig was lost. On September 8, 1660, Frederik was granted supreme power by the three estates. Christian V. (1670–99) instituted serfdom, and greatly oppressed the middle classes. In the reign of Frederik IV. the disputed claim to Slesvig was recognised (1720), and in the same year Sweden ceded to D. the right of receiving the Sound dues. A long period of tranquillity follows, chiefly marked by the restriction of the aristocratic privileges, the abolition of servitude (1787), and the general improvement of art, trade, and agriculture. In the beginning of the 19th c. Frederik VI., regent from 1784, king 1808–39, by his attitude towards Napoleon, involved D. in a ruinous war with Sweden, England, Prussia, and Russia—the chief events of which were the battle of Copenhagen under Nelson (1801), the storming of the capital itself (1807), when the entire fleet was surrendered to the English, and the subsequent cession (1814) of Norway to Sweden under Bernadotte. Christian VIII. (1839–48) made an effort to convert all the Danish possessions into one united state, and his scheme was taken up by his son, Frederik VII. (1848–63). In 1848 the Duchies of Slesvig and Holstein, with the connivance of Prussia, broke into open revolt on the subject of the succession, aggravated by the mutual dislike of the German and Danish inhabitants. But after a severe struggle the rebellion was eventually quelled by a victory at Idsted July 25, 1850. The direct Oldenburg line, founded in 1448, expired on the death of Frederik VII., November 15, 1863. Prince Christian of Slesvig-Holstein-Sonderburg-Glücksborg received the crown through his wife, a niece of Christian VIII., in conformity with 'the treaty of London' of May 8, 1852. Again the question of the accession in the duchies was revived in all its force. The Prince of Augustenborg, styling himself Frederik VIII. of Slesvig-Holstein, renewed a spurious claim that had been disposed of in 1848. He was directly aided by Germany, and it soon became apparent enough that

the Confederation was working for the sole possession of the duchies. On the 1st of February 1864 an Austro-Prussian force crossed the Eider, and subsequently laid waste the country as far N. as the Lymfjord. The Danes, who had unhappily been led to expect the assistance of England, were soon overwhelmed in the unequal contest, and by the treaty of Vienna (30th October 1864) had to surrender Lauenburg, Holstein, and Slesvig to the discretionary disposal of Prussia and Austria. The future of the duchies was made the question which led to the struggle for supremacy in the Confederation between the two great powers. Since the war of 1866 Prussia has remained silent as to the fate of Slesvig-Holstein, which meantime ranks as a German province. The Slesvigers made a futile attempt to rouse public feeling on the subject in 1875. For geography and statistics, see the works of Bergsö (Copenh. 1844-53), Erster (1856), Baggesen (2 vols. 1845-47 and 1867), Kohl (2 vols. 1846), Trap (German ed. by Sarauw, 1863), Both (1867), and the official *Résumé des Principaux Faits Statistiques du Danemark* (Copenh. 1874); for history, Allen's *Haandbog i Fadrelandets Historie* (6th ed. Copenh. 1863, German ed. by Falck, Kiel, 1842), and Dahlmann, *Geschichte von D.* to 1523 (3 vols. Hamb. and Gotha, 1840-43).

Denn'ewitz, a village in the province of Brandenburg, Prussia, 42 miles S.S.W. of Berlin, where, on September 6, 1813, General Tauentzien with 45,000 Prussians (mostly *landwehr*), after desperate fighting, forced 70,000 French, Saxons, and Poles, commanded by Marshal Ney, to commence a retreat. At this decisive moment Bernadotte, Crown-Prince of Sweden, joined the Prussians with upwards of seventy battalions of Russians and Swedes. The defeat of the French was instantly turned into a rout. They lost from 15,000 to 20,000 men, and 43 pieces of cannon ; the allies from 5000 to 6000.

Denn'is, John, the son of a saddler, born in London in 1657, was educated at Cambridge, and after travelling on the Continent, settled at London as a professional critic. He produced numerous plays, poems, and tracts, joined the Whig party, and assailed his political and literary opponents with rancorous abuse. In return, Swift satirised him with merciless wit, and Pope 'executed' him in the *Dunciad*. He is now chiefly known through the terrible retaliation which his 'frenzied' strictures provoked. In his blind and poverty-stricken age a play was acted for his benefit, to which Pope, forgetful of former strifes, contributed a prologue. D. seems to have been of a sour and suspicious nature, but to have possessed some critical insight. He died January 6, 1734. See D'Israeli's *Calamities of Authors*.

Denon, Dominique Vivant, Baron, was born at Châlons-sur-Saône, January 4, 1747. For a time he was, ostensibly, a student of the law, but really of the fine arts, a page of the chamber and a gentleman-in-ordinary to Louis XV. His great artistic powers, however, came out after the Revolution, when he accompanied Bonaparte to Egypt, and in 1802 published his *Voyage dans la Basse et la Haute Egypte*, the engravings in which were greatly admired. Bonaparte was much attached to him, and made him Inspector-General of Museums, and D. accompanied him on various of his expeditions, the result being the addition of the art treasures of more than one conquered city to the Louvre. The celebrated Column in the Place Vendôme was constructed under his direction. D., who was an editor of considerable merits, was dismissed from his offices in 1815 after the fall of his master. He died April 27, 1825, much respected for his excellent personal qualities as well as for his high taste in art. His most important work, left unfinished at his death, was completed by Amaury Duval, and published in 1829 under the title *Monuments des Arts du Dessin chez les Peuples tant Anciens que Modernes* (4 vols. Par. with 315 plates).

De non apparen'tibus et non existen'tibus e'adem est ra'tio, a maxim of Scotch law signifying that lost deeds or writings, whose import cannot be proved, are to be held as non-existent. See PROVING OF TENOR.

Dénoue'ment (Fr. from *dénouer*, 'to untie;' Lat. *de* and *nodare*), strictly the unravelling or discovery of a plot, but generally applied to the catastrophe of a play or romance. A D. should arise naturally out of the plot, and should be recondite enough to exercise agreeably the reader or hearer's ingenuity.

Dens, Peter, a once famous Roman Catholic scholar and theologian, was born at Boom, a small town near Antwerp, in 1690. His life is almost unknown, the epitaph on his tomb at Malines being our only source of information regarding his career. We learn from it that D. was for twelve years theological reader or professor at Malines, where he likewise became canon, penitentiary, priest of St Romuald's, and for forty years president of the college. He died February 15, 1775. His great work is his *Theologia Moralis et Dogmatica*, a minute and curiously casuistic vindication of Roman Catholic tenets in ethics and theology. It has no scientific merit, but is well known on the Continent, and is the favourite theological text-book in Roman Catholic colleges. An edition of this work was published at Dublin in 1832.

Den'sity (Lat. *densitas*, from *densus*, 'thick') of a body is the quantity of matter comprised in unit volume ; or is given by the equation $V\rho = M$, — where V is the volume, M the mass, and ρ the density of the body in question. It is *practically* the same as Specific Gravity (q. v.).

Denta'lium, or **Tooth Shell**, sometimes called the 'Elephant's Tusk' from its shape, belongs to the *Gasteropodous* class of molluscs, and to the family *Dentalidæ*, in which the shell is tubular, symmetrical, and of curved shape, open at both ends, and with an entire (*holostomatous*) circular aperture or mouth. The foot is pointed, and has symmetrical *Epipodia* or side-lobes. Huxley places D. in the class *Pteropoda*, from its possessing a rudimentary head, a neural flexure of intestine, the presence of the epipodial lobes of the foot, and from its development. *D. arcuatum* is the familiar species. Fossil species of D. occur in the Devonian, Carboniferous, Mesozoic, and Tertiary formations.

Denta'ria, a genus of herbaceous perennial plants belonging to the natural order *Cruciferæ*, and more commonly known by the popular name of Toothwort, of which their scientific one is the Latin translation. There are many species, natives of temperate America and Europe. The roots of *D. diphylla* (Pepperwort) have a pungent taste, and are used by the settlers in the region of America where it is found as a substitute for mustard. *D. bulbifera* is a native of the southern portions of England.

Denta'tus Man'ius, according to some **Marcus Curius**, the most famous of the Curii, was said to have derived his surname of D. from having been born with teeth. He was of Sabine descent. After holding the office of tribune of the people, he was elected consul in 290 B.C., and compelled the Samnites to sue for peace after they had waged war against Rome for forty-nine years. Immediately after he subdued the Sabines, and thus celebrated two triumphs in his first consulship. In his second consulship (B.C. 275), D. defeated Pyrrhus, King of Epirus, near Beneventum, as he was returning from Sicily, and obliged him to quit Italy. His triumph was distinguished by four elephants, the first ever seen at Rome. The booty taken from Pyrrhus was wholly given up to the republic. Elected consul for a third time (274 B.C.), he brought the final war with the southern Italians to a successful issue. In B.C. 272, during his censorship, D. built an aqueduct which brought the water of the Arno into Rome. He also dug a canal, by which the waters of Lake Velinus were precipitated into the river Nar from a height of 140 feet. This is the famous Cascata del Marmore, which inspired the splendid stanzas of Byron (*Childe Harold*, Can. iv. st. 69-72). He then retired to his Sabine farm, to devote the rest of his life to agriculture. D. is the type of the old Roman simplicity and valour, and many anecdotes finely flavoured with a spirited patriotism and unselfish honour are recorded of him.

Den'tex, a genus of Teleostean fishes included in the family *Sparidæ* (Sea-Bream, &c.). This genus, of which *D. vulgaris* is a familiar species, is found in the Mediterranean Sea, and occasionally on the S. British coasts. It has a compressed body, somewhat resembles the perch in shape, has a single continuous dorsal fin, scaly cheeks, and numerous minute teeth, with several larger teeth of pointed conformation. The *D. vulgaris* was the D. of classical writers. Its average length is from 3 to 4 feet, and its weight from 18 to 30 lbs. It is eaten both fresh and pickled in the Levant.

Den'tifrices (Lat. *dens*, 'a tooth,' and *frico*, 'I rub'), are preparations for cleansing the teeth. The daily cleaning of the teeth is of the greatest importance, which should be early inculcated on children. If teeth were regularly cleaned and

examined for incipient decay, not only toothache, but many more remote evils would be averted, for much imperfect digestion arises from imperfect mastication. Many preparations are puffed as wonderful D., but one tooth-powder is as good as another. If the taste be not objectionable, soap rubbed on the tooth-brush is a perfect dentifrice. The commonest tooth-powder is finely ground chalk, to which some aromatic ingredient, such as Orris powder, is added.

Den'tine, a tubular structure forming the chief part of the Teeth (q. v.).

Dentiros'tres (Lat. 'tooth-beaked'), one of the four sub-orders of the order *Insessores*, or Perching birds, chiefly distinguished by the upper mandible being notched in its lower margin near the tip. Most of the D. are insect-eaters. The chief families are the Shrikes (*Laniidæ*), Fly-catchers (*Muscicapidæ*), Thrushes (*Merulidæ*), Tits (*Parinæ*), and Warblers (*Sylviadæ*).

Den'tistry, as comprising dental surgery and dental mechanics, is the art of one who treats diseases of the teeth, and who fashions artificial sets. Both branches of D. have been greatly advanced of late years, the surgery branch having been formulated into a regular course of academic instruction, and the mechanical section having been entirely reformed by the application of scientific inventions.

Dental Surgery.—The chief operations in dental surgery are (1) scaling; (2) regulating; (3) stopping; and (4) extracting.

Scaling is the removal of *tartar* from the base of the teeth by means of small pointed steel instruments, and is a most necessary operation, as the accumulation of this substance absorbs and irritates the gums, and gradually loosens and decays the teeth. As a preservative, it ought to be undergone periodically, especially when the teeth are not regularly cleaned.—*Regulating* is the restoring of overcrowded or displaced teeth to their proper position, by the gradual pressure of 'regulating plates.' Teeth that have been regulated require to be maintained in their new position for some six months.—*Stopping*, or *Stuffing*, is a process performed by filling in the hollow of a decayed tooth, so as to stay the progress of decay and save the nerve from exposure. It is often necessary, however, to destroy the nerve before stopping, and this is best done by applying a pellet of cotton wool steeped in arsenious acid, chloride of zinc, or carbolic acid, for a period of at least twelve hours. The decayed hollow must then be carefully scooped out with the 'excavators' till the hard wall of dentine is laid bare. For a temporary stopping the substance commonly used is gutta-percha; the chief permanent stoppings are gold, white enamel fillings, and amalgams. After the hollow is well dried, the stopping is pressed firmly in, and the plug is smoothly finished off at the proper height of the tooth. In gold stopping, which is by far the most difficult process, the strips of gold-leaf or pellets of 'sponge-gold' are packed so that their ends, and not their flat surfaces, shall present at the top of the cavity. The gold would be apt to peel off if laid in, like the other plugs, in layers. The top is finished off by burnishing.—*Extracting* ought to be the last remedy of the dentist, as it is also the operation he is oftenest called upon to perform. It requires the use of, at least, some five pairs of forceps, and of an elevator or tooth-punch; the forceps are adapted to the variety in size, form, and situation of the different teeth. The tooth to be extracted must be carefully seized by a sound part, and its detachment from the socket should be by a lateral or semi-rotary motion in the direction in which it will offer the least resistance. This necessarily presupposes, on the part of the operator, a knowledge of the anatomical peculiarities of the teeth.

To arrest the progress of decay in the teeth is the first object of the dentist, and hence the importance of scaling and stopping. But when a tooth is too much decayed to admit of stopping, and is occasioning pain, it is to be removed altogether. It may be well to state that a skilled dentist can best decide whether a tooth should be treated by stopping. In the extraction of teeth, anæsthetics, local and general, are now widely used; chloroform and ether giving place rapidly to nitrous oxide gas. This last, although it requires to be used cautiously, like other anæsthetics, may be safely employed, except on children under seven years of age, or when the patient is very old, or of plethoric habit, or when he suffers from hæmoptysis or pulmonary disease.

Dental Mechanics.—This department of D. mainly deals with the replacement of lost teeth by artificial ones. It also embraces the treatment of deformities of the mouth, as in cleft palate. (See PALATE.) The manufacture of the teeth employed by the dentist has risen into an independent industry of great importance, in which there is a strong competition between the great producers, basing on various inventions, and holding as secret their different processes. The composition of which the teeth are generally made consists of certain proportions of kaolin (white clay), silex, and felspar; none of these minerals are fusible at a low temperature, nor, when fused, are they acted upon by acids. After an elaborate system of moulding, enamelling, and baking, the teeth receive their colours and shades from a delicate manipulation of metallic oxides. The main operations of the dentist are—(1) Taking an impression of the mouth in beeswax, plaster of Paris, or in certain compositions; (2) casting a model from the impression in plaster or in zinc, occasionally with a counter-die in lead; (3) forming, by means of the dies, a vulcanite base, a celluloid base, or plates in gold, dental alloy, or in alloys of gold, copper, silver, platinum, &c.; and (4) adjusting and fixing the teeth upon the base or plate.

The dentures may be either partial or complete, *i.e.*, may either embrace a few or an entire set of teeth. Single teeth are usually fixed in a peculiar manner. A pivot attached to the artificial tooth is passed into the natural pulp cavity, which has been previously prepared; when a wooden pivot is used, it is maintained in position by the swelling of the wood, when of metal, the pivot is properly fastened with mastic, &c. The vulcanite base is in more general use than the gold plate, and its construction necessarily is now carried to great perfection. The celluloid base above mentioned consists of collodion, a preparation of camphor and gun-cotton, and was first produced in 1871. It is easily prepared, and is light and comfortable to wear, while its pink is natural in appearance. See Tomes' *System of Dental Surgery* (2d ed. Lond. 1876), Oakley Coles' *Dental Mechanics* (Lond. 1873), and Sewill's *Anatomy and Dental Surgery* (Lond. 1878).

Denti'tion, the name applied to the process of tooth-development and succession, and also to the arrangement and description of the various teeth found in the mouth, particularly of *Mammalia* (q. v.). Most mammals have two sets of teeth, and are hence termed *diphyodont*; those in which one set only is developed are termed *monophyodont*. The first set is named the *milk*, *temporary*, or *deciduous* set. The teeth in mammals are never united by bony union or *ankylosis* with the jaw-bones, as in lower forms; and they are confined to the jaw-bones, being developed from *alveoli* or *pockets*. The different kinds and structure of teeth are described in the article TEETH (q. v.), and their functions under the head of DIGESTION (q. v.). Naturalists express the arrangement of the teeth in any animal by a *dental formula*. The dental formula of man runs as follows:—

$$\text{I. } \frac{2-2}{2-2} \quad \text{C. } \frac{1-1}{1-1} \quad \text{P.-M. } \frac{2-2}{2-2} \quad \text{M. } \frac{3-3}{3-3} = 32$$

And that of the sheep, for example, is thus stated:—

$$\text{I. } \frac{0-0}{3-3} \quad \text{C. } \frac{0-0}{1-1} \quad \text{P.-M. } \frac{3-3}{3-3} \quad \text{M. } \frac{3-3}{3-3} = 32$$

The meaning of these convenient formulæ is readily understood. The letters stand for the various kinds of teeth (incisors, canines, præmolars, and molars). The figures *above* each line indicate the teeth in the *upper* jaw; those *below* the line indicating the teeth in the *lower* jaw; whilst the further division of the figures, above and below each line, indicate the number of teeth in each side of each jaw respectively. We read the D. formula of man, then, as expressing that he has 2 incisors in each side of each jaw; 1 canine in each side of each jaw; 2 præmolars in each side of the upper, and the same number in each side of the lower jaw; and 3 molars in each side of each jaw—making a total of 32. Similarly in the sheep, there are no incisors and no canines in the upper jaw, but 6 incisors (3 in each side) and 2 canines (1 in each side) of the lower jaw; and then there are 6 præmolars and 6 molars in both upper and lower jaws. In man the teeth are developed in little sacs (*dental sacs*) formed in the gums, the little *papilla* or process enclosed in each sac becoming encrusted, as it were, by the hard structures of the tooth, and the papilla itself forming the pulp of the future tooth. The temporary or milk-teeth are gradually pushed out by the permanent teeth, or they may decay or be absorbed. The milk-teeth of man number 10 in each jaw, and thus comprise 4 incisors, 2 canines, and 4 molars. These 10 teeth are replaced

by the permanent teeth, and in addition 6 other teeth appear in the permanent set of each jaw, the latter being the true molars, which are thus not represented in the milk set. The permanent teeth are being developed during the formation of the milk-teeth, each permanent tooth being, in fact, developed in a little sac partitioned off from the dental sac in which its milk predecessor is formed. In the seventh month after birth, the central (lower) milk incisors generally appear, the molars about the thirteenth month, and the milk set may be completed from the eighteenth month to the second or even third year of life. The permanent teeth appear about the seventh year of life; the first true molar generally being developed before the other teeth, and being soon followed by the permanent central incisors. The permanent canines appear about the twelfth year of life; and the last molars, or 'wisdom teeth,' may vary in their development from the sixteenth or seventeenth, to the twenty-first or twenty-third year of life.

D'Entrecasteaux', the name given in memory of a French navigator to an archipelago, cape, and channel in Australasia.—1. The *archipelago* lies in the S. Pacific, E.S.E. of New Guinea, in S. lat. 10°, E. long. 151°.—2. The *cape* is on the S.W. coast of W. Australia, in S. lat. 34° 52', E. long. 116° 1'.—The *channel*, about 40 miles in length, and from 3 miles to 9 miles in breadth, divides Bruné Island from the S.E. coast of Tasmania, its centre being in S. lat. 43° 25,' and E. long. 147° 6'. It contains several excellent harbours.

Denuda'tion (Lat. 'the making *nude* or bare') in geology, the term applied to the wearing away of rock masses, and to the consequent laying bare of underlying rocks. The chief agents which effect D., are rivers, glaciers, and ice action generally, rain, atmospheric action, &c. D. is thus another name for the reconstruction of rocks, since from the matters taken from the land new sedimentary formations are produced. The consideration of D. leads the geologist to study how the features of our earth have been sculptured out. The process of D. may be divided into *subaerial D.*, as effected by rivers, ice, &c., and *marine D.*, as effected by the sea and its tides. Subaerial denudations cut down the land surfaces into valleys, whilst marine D. tends to form plains.

Deob'struents (from Lat. *de*, 'away,' and *obstruere*, 'to obstruct') are medicines which remove any abnormal enlargement or tumour. Certain medicines when taken internally, or when rubbed on the skin, cause absorption of enlarged glands and other tumours. Among the most powerful of these are iodine, bromine, and mercury, with their several preparations.

Deobund', a town of British India, district of Suharunpore, N.W. Province, 20 miles S.E. of Suharunpore, between the Hindun and Kali Nuddee, branches respectively of the Jumna and the Ganges, and on the railway from Suharunpore to Mozuffurnuggur. Pop. (1872) 21,714.

De'odand. Formerly, by the law of England, any personal chattel (see CHATTEL) which by accident caused the death of a human being was forfeited to the crown or lord of the manor, that it might be sold and the proceeds distributed among the poor. D., as the name imports (*Deo dandum*), was originally an atonement to God for the untimely death of one of his creatures. Deodands are abolished by 9 and 10 Vict. cap. 62.

De'odar. See CEDAR.

Deodar', a protected independent state, in the N.W. of Guzerat, India, with an area of 80 miles, and a pop. of 2000. Each village forms the capital of an independent community. D. having become a haunt of robbers, the East India Company assumed the protection of it in 1819.

Deo'dorisers are chemical substances which have the power of destroying odours. D. may or may not be Antiseptics (q.v.) or Disinfectants (q. v.).

D'Éon, The Chevalier, a famous diplomatic agent, was born of an ancient family at Tonnerre, Burgundy, 2d October 1728. He was employed on a mission to St Petersburg in 1755, was aide-de-camp to Marshal Broglio in the campaign of 1762, in 1763 accompanied the Duc de Nivernois to England as secretary, whose place he filled when the Duc left this country, till he was superseded by the Comte de Guerchy. In 1771 his sex began to be doubted, since he had, from caprice, or from purposes of intrigue, dressed as a female. He returned to France in 1777, when he assumed the female dress at the request of the queen, and in 1785 revisited England, where he died, May 21, 1810, when medical inspection put the question of his sex beyond doubt. D. wrote various historical and political works, which were published in 13 vols. in 1775.

Deoxida'tion, or **Reduc'tion,** signifies the removal of oxygen from a substance. Most metals are separated from their ores by D., for in the majority of cases the ore is an oxide of the metal, or is converted by roasting into the oxide. (See METALLURGY.) The deoxidising agent employed in the extraction of metals generally contains carbon—an element having at a high temperature a strong affinity for oxygen. When the oxide is heated with carbon, the latter abstracts its oxygen, and combines with it, forming carbonic oxide (CO) or carbonic acid (CO_2). Carbonic oxide is itself a powerful reducing agent, being prone to take up oxygen and pass into carbonic acid. Thus carbonic oxide is often purposely produced (by burning carbon in a limited supply of air) for the purpose of reduction, instead of acting on the substance to be reduced with carbon alone. This is the case in Iron Smelting (q. v.).

Depart'ment (Fr. *département*), a name widely applied in England to a section of the administration, as the Home D., the War D., &c., but used to designate a territorial division of France since 1789. After the abolition of the aristocracy, Mirabeau suggested that, as the existence of large provinces tended to prevent centralisation and to foster local power, a subdivision should be made, and this was followed by the redistribution of the thirty-four provinces into eighty-three departments by decree of the Assembly dated 16th February 1790. These departments, named usually after geographical features, were subsequently increased to 140, but were again reduced to eighty-three at the peace of 1814. Their number has varied greatly with the vicissitudes of the nation, and now amounts to eighty-seven. They elected their own governors till Napoleon I. took away the privilege, and established the right of the head of the state to place over each a *préfet* and a *conseil de préfecture*. The D. is divided into arrondissements, each of which is under a *sous-préfet*, while the arrondissements are subdivided into cantons, and these again into communes, corresponding somewhat to our parishes. Several of the states of Central and S. America have adopted a division into *departimientos*, which correspond, however, only in name to those of France.

Depen'ding Action. In Scotch law, an action is held to be in dependence from the moment of the Citation (q. v.) until the final decision of the House of Lords, should an appeal be made to that tribunal. During dependence, the pursuer is entitled to use Inhibition (q. v.), or Arrestment (q. v.), as security for fulfilment of the decree by the defender, should judgment be against him.

Dephal (*Artocarpus Lakoocha*), a tree, a native of India, the fruit of which, though eaten, is inferior to that of its congeners, the Bread-Fruit (q. v.) and Jack (q. v.). The wood is used for building, the root for dyeing, and the thick tenacious juice for birdlime.

Depil'atories, or **Epil'atories** (Lat. *de*, and *e* or *ex*, 'from,' and *pilus*, 'a hair'), are substances used to remove hair from the face or body. The safest D. are made with quicklime and other ingredients, as sulphate of sodium and starch, made into a paste and applied to the part. Sulphide of barium has been used for D. instead of quicklime. Orpiment, the yellow sulphide of arsenic, is sometimes mixed with lime to form D. D. containing arsenic are dangerous. Orpiment one ounce, quicklime one pound, starch ten ounces, and sufficient water to make a paste, is supposed to constitute the famous D., the *Rusma* of the Turks.

Deploy' (Fr. *déployer*, 'to unfold'), in military nomenclature, means to form or extend troops from column into line.

Depos'it (Lat. 'a laying down'), in geology, a name given to sedimentary or aqueous rocks made by the Denudation (q. v.) and 'laying down' of other formations. Deposits are *marine* when formed in the sea, *lacustrine* in lakes, *fluviatile* in rivers, &c.

Deposit, in English law, a bailment of goods to be kept by the bailee, without reward, and delivered according to the object and purpose of the trust. (See BAILMENT, BORROWING, CARRIERS, TROVER.) The principles of the Roman law regarding D. have been adopted by modern nations; and in Scotland the name of the contract is preserved. He who deposits is called the *depositor;* he who receives, the *depositary.* The contract is completed by delivery of the subject. The right of property and risk remains with the depositor, on whom, if the subject is injured or destroyed accidentally, the loss falls. The depositary, until the subject is demanded back, is liable only for gross negligence; but if he unduly delay to re-deliver the subject after requisition, he will be liable for an accident. There are special kinds of D. See CONSIGNMENT; NAUTÆ, CAUPONES, STABULARII; TRUST, STOPPAGE IN TRANSITU.

Deposi'tion, in English and Scotch law, signifies the testimony of a witness taken in writing. Information given on oath, and the evidence of witnesses before magistrates and coroners, are put into writing in the words used by the witnesses, or as nearly so as possible. The person who makes oath judicially is called a *deponent.* Evidence in the Court of Chancery was formerly taken in written answers to written questions. By the Law of Evidence (q. v.) a D. cannot be received where the witness can be himself produced, unless he has become insane since giving his testimony. See DYING DECLARATION.

Deposition is an ecclesiastical sentence on a clergyman for crimes, scandalous immorality, or promulgating doctrine contrary to the standards of his church. It amounts to degradation from his office—that is, a total and perpetual suspension of the power and authority committed to him in his ordination, reducing him to the condition of a layman, and removing all emoluments he may enjoy as a clergyman. In churches which hold the indelible nature of Orders, the clergy may be *deprived* but cannot be *degraded.* See Bingham's *Ant. of the Christian Church*, and Blunt's *Dictionary of Doctrinal and Historical Theology.*

Depôt (Fr. *dépôt*, from Lat. *de*, 'down,' and *positum*, 'placed'), in military language, a place where army stores are kept and recruits trained. The term is now usually applied to that portion of a brigade which remains at home while the rest are upon foreign service. The regimental D. system has existed in the British army since about 1825, but it was not completely developed until 1872, when Great Britain and Ireland were distributed into military districts and subdistricts, each of the latter apportioned to a brigade with a D., and having a lieutenant-colonel appointed to it. The sum of £3,500,000 was voted by the House of Commons in 1872 to provide for the development of the D. system. Formerly a man enlisted into a regiment or a battalion of the line, he now enlists into a brigade, and is drafted off as required. Canterbury is the cavalry D. for the whole country, and under the Localisation of Forces Act, there is an infantry D. for each subdistrict. Thus brigade D. No. 2 is in Carlisle; to it the 34th foot, the 55th foot, and the Cumberland and Westmoreland militia and volunteers look as the place where recruits are to be sent and trained. In the monthly army reports the headquarters and the D. of a regiment are always given. See DISTRICTS, MILITARY.

Depres'sion, Angle of, in trigonometry, is the angle which the line drawn from the spectator to an object *below* him makes with the horizontal plane. Hence the D. or dip of the horizon is this D. from the true horizontal plane, due to elevation of the observer above the surface of the earth. This is the *true dip*, with which the observed dip never agrees, on account of the refractive power of the atmosphere. The true dip in minutes gives the distance to the observed horizon measured in nautical miles, an exceedingly convenient rule for the mariner, to whom the dip is of the greatest importance.

Depriva'tion is an ecclesiastical censure whereby a clergyman is deprived of all the revenues and privileges of his benefice, and all control over it. It may be temporary or perpetual. Perpetual D. necessarily forms a part of Deposition (q. v.), along with degradation, and temporary D. is one of the forms of Suspension (q. v.).

De Profun'dis ('out of the depths'), the first words in the Latin Vulgate of the 130th Psalm, forming part of the burial service in the Roman Catholic Church. It is appropriately sung at the moment when the body of the dead is committed to the 'depths' of the earth, and the hearts of pious mourners can only be cheered by the closing assurance of a 'plenteous redemption.'

Dep'tford ('the deep ford'), a town partly in Kent and partly in Surrey, on the right bank of the Thames, at the mouth of the Ravensbourne, 4 miles E. of London. It consists of the two parishes of St Nicholas and St Paul, the former containing in 1871 a pop. of 6474, and the latter a pop. of 53,714—total, 60,188, most of them employed in the Royal D. Dock and Victualling Yards, and in private machine-works and shipbuilding yards. The Master and Brethren of the Trinity House of D. Strond have a hall and two sets of almshouses here. D. forms a part of the parliamentary borough of Greenwich, which sends two members to Parliament.

Deptford Dockyard was established for shipbuilding purposes by Henry VIII. in 1513, and was subsequently used also as a victualling depot for the British navy. In 1865 shipbuilding was discontinued, the slips being unfit for the large war-ships, and D. D. was for a short time the principal victualling yard for the British navy at home and foreign stations. It also supplied clothes, bedding, and other naval stores. In March 31, 1869, it was purchased by Mr J. P. Austin for £70,000, who sold part of it to the Corporation of London for £94,640, to be used by them as a market for foreign cattle. It was opened for this purpose on December 28, 1871.

Dep'uty (Fr. *député*, from Low Lat. *deputo* = Class. Lat. *delego*, 'I send or place in the stead of another'), one who exercises an office under another. The principal is liable for the acts of his D., but the granter is not liable for the acts of his assignee. No judge has the power to appoint a D. unless authorised to do so by the grant to himself. A D. appointed by a D. is usually called a substitute. See ASSIGNS, SHERIFF, &c.

De Quin'cey, a great English prose writer, was the son of a Manchester merchant, and was born at Greenhay near Manchester, August 15, 1785. He received his early education at Bath and at Manchester, and was a student at Oxford from 1803 to 1808. Thenceforth until 1829 he resided chiefly at a cottage in Grasmere in the Lake country, becoming intimate with Wordsworth, Coleridge, and Southey, and contributing largely to journals, especially to the *London Magazine* and *Blackwood.* During this period he became a confirmed opium-eater, having at first indulged in the drug to allay physical pain. In 1816 he was taking 8000 drops a day, but, after several years of suffering and mental lethargy, he to a great extent renounced the habit. Little is known of his life until 1843, when he settled at Lasswade, near Edinburgh. He died at Edinburgh, December 8, 1859. D. was an exquisite writer and scholar, and a fascinating conversationalist, but his fragmentary works are evidently the outcome of a fitful and relaxed though powerful genius. They are distinguished by imaginative grandeur, subtle originality, and a luxuriance of erudite diction, and are unsurpassed for the stately pomp and artful melody of the sentences, but are occasionally marred by a wayward fondness for paradox. D. claimed to have introduced 'a new *mode* of impassioned prose,' in which the writer's individual experiences are rendered interesting by the splendour of the literary setting, as in his *Confessions of an English Opium-Eater*, his *Autobiography*, and in the dreamy, fiery rhapsodies of the *Suspiria de Profundis*, the finest of all his works. His other writings comprise critical essays on Homer, Milton, Shelley, Wordsworth, Greek tragedy, the Greek orators, &c.; biographies of Shakespeare, Pope, Goethe, and Schiller; superb historic or visionary descriptive pieces, such as *The Cæsars*, *Joan of Arc*, *The Revolt of the Tartars*, *The English Mail-Coach;* and miscellaneous articles on the most varied subjects—*The Theban Sphinx*, *Political Economy*, *Judas Iscariot.* His peculiar humour is shown in his *Murder Considered as one of the Fine Arts.* D. was among the first writers who leavened English literature with German thought. Most of his productions are contained in the last edition of his works (16 vols., Edinb. A. & C. Black). See his *Life and Writings*, by H. A. Page (Lond. 1877).

Derajat' (from *dera*, 'a camp'), a frontier district of the Punjab between the Suliman Mountains and the Indus, 250 miles in length, with a maximum breadth of 60 miles. It is watered in the N. by the Gannil. D. is held by Pathan tribes in the N., who number 3000 fighting men, and by Belooch tribes in the S.,

The chief towns are Dera Ismail Khan, Kaheri, and Dera Ghazi Khan, all on the Indus.

Der'bend, or Derbent ('the shut-up gates'), capital of the government of Daghestan, lieutenancy of the Caucasus, Asiatic Russia, on the W. shore of the Caspian. Pop. 15,739. It lies at the mouth of a defile, is in the form of a parallelogram, three miles long by half a mile broad, and is surrounded by a massive wall with two large gates. D. is the ancient *Albaniæ Pylæ*, and is said to have been originally fortified by Darius I. as the key of the Persian Empire on that side. Much saffron is grown in the neighbourhood, and there are manufactures of copper and iron vessels and woollen stuffs.

Derby, the county town of Derbyshire, on the right bank of the Derwent, at the fringe of a mining district, and 132 miles N.N.W. of London on the Midland Railway. It stands in a beautiful and fertile valley, and is built mostly of brick, the chief buildings being the town-hall, the new market-hall, corn exchange, the new free library (1876), the infirmary, the theatre, the county lunatic asylum, and new School of Art (1877). The chief churches are All Saints (rest. 1876) and St. Alkmund. In 1867 Mr T. Bass presented the municipality with a recreation ground. Its grammar-school was founded in 1162. There are large markets here on Tuesdays and Fridays. The chief manufactures are of silk, cotton, iron, chemicals, paper, and porcelain. The famous *D. China*, distinguished for its beautiful flower-painting, has been manufactured here since the middle of the 18th c. (See *Old D. China Factory*, by J. Haslem, Lond. 1876.) The cutting and polishing of Derbyshire marble or fluor spar is also a large industry. Pop. (1871) 49,773. The name D. is derived either from *Deoraby*, the name which the Danes gave the English *Northweorthige*, or from *Derventio*, the Roman station, or, most probably, is a contraction from Derwentby, the village on the Derwent. D. returns two members to Parliament. See Bemrose, *Derbyshire Guide* (new ed. 1878).

Der'by, the titular name of a great English family, which took its rise in the lordship of Stanleigh (Stony Lea), in the county of Derby, afterwards exchanged for another property in Staffordshire. The most distinguished of the earlier members of the family are **Thomas Stanley**, whose father was made Lord Stanley in 1456, and who, at the battle of Bosworth, by espousing the side of the Earl of Richmond against Richard III., ensured the success of the former, and crowned him as Henry VII. He was in 1485 rewarded with the dignity of Earl of D. and the position of Lord High Steward of England.—**James Stanley**, seventh Earl of D., who took the Royalist side during the civil war, having been taken prisoner at the battle of Worcester in 1651, was beheaded at Bolton in the same year. His widow, Charlotte, daughter of the Duc de Tremouille, is famous for her gallant defence against the Parliamentary forces of Latham House and the Isle of Man, which through marriage had come into the possession of the Stanley family. She had in the end to yield, but lived to see the restoration of Charles II. To the present century belong two illustrious members of the family. **Edward Geoffrey Smith-Stanley, 14th Earl of D.**, was born at Knowsley Park, Lancashire, March 29, 1799. He was educated at Eton and Christchurch, Oxford, where, in 1819, he gained the Latin verse prize. D., then known as Mr Stanley, threw himself keenly into politics on the Whig side, was returned for Stockbridge in 1820, and subsequently for Preston, Windsor, and N. Lancashire. In 1830 he became Chief Secretary for Ireland under the administration of Earl Grey, took an important part in the passing of the Reform Bill of 1832, and carried two important measures, the one relating to Irish Church temporalities, and the other giving national education to Ireland. At the same time he reached the first rank among parliamentary speakers by his fiery eloquence, which, aided by a singularly fine presence, gained for him the title of the 'Rupert of Debate,' and by his quickness of retort, which has been compared to an instinct. He was looked upon as the ablest opponent of O'Connell in his movement for the repeal of the Union. In 1833 he became Colonial Secretary, and carried the measure for emancipating the slaves in the West Indies. In 1834 D. seceded from the Cabinet on the Irish Church question, and subsequently was identified with the Conservative party. He became Colonial Secretary in the Peel administration of 1841; in 1845, when Sir Robert Peel brought in his bill for the repeal of the corn laws, he withdrew from it, and became the chief of the Protectionist party. D., after his succession to the earldom in 1851, thrice became Premier—in 1852, only for a few months; in 1858-59, when he was overthrown on the question of parliamentary reform; and in 1866-68, when, with the help of Mr Disraeli, he carried the existing Reform Act, which, however, was so completely modified by the Liberal opposition, that, according to the unimpeachable testimony of the Duke of Buccleuch, nothing was left of the original bill but the word 'whereas.' In February 1868 failing health compelled him to resign office, and he was succeeded as Premier by Mr Disraeli. He died October 23, 1869, his last public act being to protest in the House of Peers against Mr Gladstone's bill for the abolition of the Irish Church. D. was a man of high scholarship, as is shown by his translation of Homer's *Iliad* into unrhymed iambics (2 vols. Lond. 1864), which has received just praise for its elegance and exact rendering of the original. But it is not poetry: it is only admirable verse, expressed in faultless 'House of Commons' English. In 1852 D. was elected to succeed the Duke of Wellington as Chancellor of the University of Oxford. In 1825 he married the second daughter of the first Lord Skelmersdale, by whom he had a considerable family.—**Edward Henry Smith-Stanley, 15th Earl of D.**, eldest son of the above, was born at Knowsley Park, July 21, 1826, and educated at Rugby and Trinity College, where he took a first class in classics, in addition to other honours, in 1848. In December of the same year, and while absent in America, Lord Stanley, as he was then styled, was elected M.P. for King's Lynn, and in 1850, after a tour in the West Indies, made his mark in the House of Commons by a speech upon our sugar colonies. In the course of a tour in the East, D. was appointed, March 1852, Under-Secretary for Foreign Affairs under his father's first administration. D., who at this time was thought by many to be more of a Liberal than of a Conservative, was in 1855, on the death of Sir William Molesworth, offered the seals of the Foreign Office by Lord Palmerston, but declined to quit his party. In 1858, under his father's second administration, D. became, first Colonial, and then Indian Secretary. It was while he held the latter office that the Indian mutiny was suppressed, and the management of our Indian Empire transferred from the East India Company to the Home Government. In his father's third administration of 1866, and in the succeeding administration of Mr Disraeli, D. held the seals of the Foreign Office, and obtained (at the time) much popularity by his settlement of the Luxembourg difficulty. He greatly assisted Mr Disraeli in carrying through his Household Suffrage Bill. D., who succeeded to the peerage in 1869, again became Foreign Secretary in February 1874, on the resignation of Mr. Gladstone, and the accession to power of Mr. Disraeli. This office he held till 1879. D. has always shown a strong interest in social, educational, and economical questions, and has served as a member of several Royal Commissions, including the Cambridge University Commission, 1856-60, while he was chairman of the Commission on the Sanitary State of the Indian Army in 1859-61, and of that on Patents, 1863-64. He was installed Rector of the University of Glasgow, April 1, 1869, and on December 18, 1875, Rector of that of Edinburgh. D. is strangely unlike his perfervid and chivalrous sire. He is the reverse of eloquent, is distinguished simply by strength and sobriety of judgment, by the practical philosophy of his singularly lucid speeches, by freedom from sentimentality, and a strong tendency to 'minimise' what others consider great.

Derby-Day, the second day of the Grand Spring Meeting at Epsom, when the Derby stakes of 50 sovereigns each, instituted by the Earl of Derby in 1780, are run for. It falls on the Wednesday after Trinity Sunday, and is the great London holiday. Shops are shut, and Parliament does not sit. For hours the road from London to Epsom presents a throng of vehicles of every kind, and the humours of the road resemble the Roman Saturnalia. Trains arrive at the station at short intervals, and before the event of the day comes off, the Downs are covered with pleasure-seekers of all ranks. Frith's well-known picture of the D. is in the Museum at South Kensington.

Derbyshire, one of the N. midland counties of England, having York on the N., Nottingham on the E., Warwick and Leicester on the S., and Stafford and Chester on the W. Its greatest length is 56 miles; its greatest breadth, 34.

Area, 1025 sq. miles; pop. (1871) 379,394. The S. and S.E. parts of D. are comparatively level, and generally fertile and well-cultivated, but the N. and N.W. portions are rugged and hilly, and remarkable for the romantic beauty of the scenery. Precipices and caverns abound, and the streams sometimes disappear among the cavities of the limestone formations. The hills seldom exceed 1800 feet; the Peak, the highest elevation, is only 2000. The chief river is the Trent, with its tributaries the Derwent and Dove. The scenery of the latter is pre-eminently beautiful. Smaller streams are the Wye and the Rother. There are warm mineral springs at Buxton and Matlock, and numerous calcareous springs in various parts of the county, which incrust substances immersed in them. D. is rich in minerals; coal, iron, lead, zinc, manganese, copper, mineral oil, marble, fluor spar, alabaster, pipeclay, and chert being found. It is intersected by six canals and various railways. The climate is cool and moist, especially in the higher parts; wheat, barley, and oats are the principal crops, but much of the land is in pasture. More than five-sevenths of the area of D. is cultivated, there being (1875) 73,698 acres under corn crops, 22,404 under green crops, 34,344 under clover and grasses in rotation, and 363,087 under grasses not in rotation. There is much dairy farming. The manufactures are cotton, silk, worsted goods, porcelain, spar and alabaster ornaments. Chief towns:—Derby, Ashbourne, Buxton, Chesterfield, and Belper. D. returns six members to Parliament. There are many British and Roman antiquities. See Bemrose, *D. Guide* (new ed. 1878).

Derbyshire Spar. See FLUOR SPAR.

Derec'ské, a town of Hungary, 12 miles S. of Drebreczin. Near it are four lakes from which soda is obtained, and in one of which small pearls are found. Lake Fingoto, in the neighbourhood, is celebrated for its baths. Pop. (1870) 7334.

Dere'ham, East (Old Eng. *Deorham*), a town in the centre of the county of Norfolk, 16 miles W.N.W. of Norwich, with a spacious market-place. The poet Cowper was buried in the old church. D. has manufactures of agricultural machines, and an active trade in corn and cattle. Pop. (1871) 3689.

Der'elict (Lat. *derelictum*, 'anything abandoned'), an English law-term signifying anything forsaken, or left, or wilfully cast away. D. lands suddenly left by the sea belong to the crown; but if the sea recede gradually, the gain goes to the owner of the adjacent lands. (See ALLUVION.) A ship does not become D. until she has been abandoned by her master and crew without intention of returning. When D., first comers are entitled to take possession of her and claim Salvage (q. v.) from the owner or person having right to the wreck. Under the Merchant Shipping Act the Board of Trade is, with consent of the Treasury, authorised to appoint in any district a receiver of wreck, who has due power to fulfil the duties of his position. Articles washed ashore must be delivered to the receiver, who has power forcibly to suppress disorder or plundering. Description of wreck is to be without delay affixed to the nearest customhouse; and if the value of the wreck exceed £20, a description must also be sent to *Lloyds* (q. v.). If no one proves himself the owner within a year from the receiver taking possession, then the wreck, on payment of salvage and expenses, is to be given to the person having the right to it, which may be the lord of the manor, the mayor, the admiral, or the crown.

Derelic'tion, a term of Scotch law nearly equivalent to the English term *Derelict* (q. v.). Stray cattle, if ownership is not proved within a year, are escheated to the crown; but if the thing found be inanimate, the owner may reclaim within forty years. See, regarding land left by the sea, article ALLUVION. The word is also used in the law of Scotland regarding *teinds* (tithes) relative to valuations.

Derg, Lough (Gael. 'the red lake'), in the S. of Donegal county, 3 miles long by 2½ broad, has many small islands, one of which, Station Island, is famous as a place of pilgrimage. Between 10,000 and 15,000 pilgrims visit it annually from 1st June to 15th August. It is only about an acre in extent, but there are two small chapels on it, with a house for the officiating priests, and some cabins. The river Derg flows from Lough D. for 17 miles to the Foyle.—Another and a much larger *L. D.* is only an expansion of the Shannon. It lies between Tipperary on the S.E. and Galway and Clare on the N.W., and is 24 miles long and from 2 to 6 broad.

Deriva'tion. See ETYMOLOGY.

Deriva'tion, in medicine, a term used by the older physicians, signifying the drawing of *humours* from one part of the body to another, and thereby effecting a cure. It is not much used by modern writers. A good example of what is meant consists in placing a blister behind the ear to benefit an affection of the eye.

Der'ma (Gr.), the name given to the true skin. The skin consists of two layers, an upper or epidermis, and a lower or D., or *cutis vera*. See SKIN.

Dermatol'ogy (Gr. *derma*, 'the skin,' and *logos*, 'a discourse') is that branch of medicine which treats of diseases of the Skin (q. v.).

Dermat'ophytes, low forms of Fungi (q. v.), which grow parasitically on the skins of man and other animals, producing Ringworm (q. v.), Favus (q. v.), and similar forms of skin-diseases. The best application for destroying them is sulphurous acid.

Dermes'tes, a genus of Coleoptera or Beetles, belonging to the family *Dermestidæ*, and to the section *Pentamera*. The antennæ are shorter than the thorax, and are club-shaped. The best-known species is the *D. lardarius*, or bacon-beetle, the larvæ of which are found in bacon, cheese, &c. This beetle is about one-fourth of an inch long, the colour being black. *D. murinus*, *D. vulpinus*, and *D. pancerus* are also well-known species.

Dermop'terous Fishes (Gr. 'skin-finned'), a term, not now generally used, for fishes (*e.g.*, lampreys) in which the rays of the medium fins are very soft.

Derr'ick, a kind of Crane (q. v.), much used in stoneyards, and generally when a great height of lift and varying radius is required. It is fitted with a movable jib, jointed at its lower end to a mast supported by stays, and weights can be laid down at any point within the height and swing of the machine. The angle of the jib is varied by turning a barrel, or drum, connected with the jib-head by a chain which passes over a pulley at the apex of the crane. The machine may either be worked by hand or steam power. Of movable derricks, or those capable of transporting a load from one place to another, the floating are the most important. They are of immense power, and are extremely effective in raising vessels, placing machinery, &c.

Der'vish (Pers. *Derwêsh*, 'a poor man or beggar,' from *derew*, 'to beg'), the name of a class of Mohammedan devotees, very numerous in Turkey and Persia, who considerably resemble the monks of Europe. In Hindustan they are called *Fakirs* (q. v.). They live partly in monasteries, partly as vagrants, and are divided into various orders, each of which imposes its peculiar novitiate and religious exercises, which are strictly observed, and are very severe. They engage in frequent fastings, mortifications, and circular dances. Their dances, which are accompanied by violent cries and contortions, are often prolonged until the performers faint. In their frenzies they burn and gash themselves with red-hot swords. They are accredited with great sanctity, and with power to heal diseases and interpret dreams.

Der'went, a principal river of Tasmania, near the centre of which it rises in Lake St Clair. After a winding S.E. course, it falls into D'Entrecasteaux Channel by an estuary varying from 1½ to 4 miles in breadth. Hobart Town (q. v.) is situated on its right bank, 13 miles from its mouth, and for 9 miles higher up the D. is navigable for ships of any size.

Der'wentwater (Celt. 'the bright or clear water'), also **Kes'wick Lake**, the most beautiful of all the English lakes, lies in the S. of Cumberland, and is formed by an expansion of the Derwent, 3½ miles long by 1½ broad, with steep banks, and dotted with wooded islands, of which Vicar's Island, Lord's Island, and St Herbert's are the largest. At the foot of the lake, in the gateway of Borrowdale, are Scawfell, Great End, Glaramara, and Castle Crag. Sometimes there floats on the surface a mass of soft earthy matter known as the 'Floating Isle.' D. abounds in trout, pike, and perch. Keswick stands on its N.

shore, and the Cataract of Lodore (celebrated by Southey), with a fall of 100 feet, is near its S.E. corner. D. has a depth of 72 feet, and lies 222 feet above the sea.

Derwentwater, James, Earl of, a gallant but unfortunate Jacobite leader, was born in 1688. His father died in 1705, and D., who had been educated in France, returned to the family seat of Dilston, in Northumberland, where, becoming known as a Jacobite, warrants were issued for his apprehension in 1714. He threw himself into the rising of 1715, was taken prisoner at Preston, removed to London, and beheaded, 24th February 1716. D., for whom much sympathy was felt by the public, was the last Earl of the name.

Derza'vin, Gabriel Romanovicz, a Russian lyric poet, was born at Kazan, 14th July 1743. He studied at the gymnasium there, joined a regiment of Guards in 1762, and for his skill in drawing and mathematics was placed in a military school by Count Schuvalov. His talents soon became known, and under the Empress Catherine, and the Emperors Paul and Alexander I. he filled some of the highest offices of the state. In 1804 he withdrew from public life, and till his death, 21st July 1816, devoted himself entirely to poetry. His best-known ode, addressed *To God* (translated into English by Bowring and others), owes something to Young's *Night Thoughts;* but his other works are free from imitation. His sentiments are pure and his ideas lofty; but his language is too richly metaphorical, and sometimes passes into Oriental extravagance. His collected works (5 vols. St Petersb. 1810-15) were republished by the Russian Academy of Sciences in 1864-65. His posthumous memoirs were published at Moscow in 1860.

Desaguade'ro (Sp. 'the channel') is the name of several waters in S. America, of which the most important are:—1. A river of Bolivia, which rises in Lake Titicaca at a height of 12,850 feet, and after a course of 180 miles enters Lake Aullagas, 12,280 feet above the sea. This is probably the highest river in the world.—2. A river of the Argentine Confederation, which is fed by a multitude of streams from the E. side of the Andes, and flowing through lakes and salt marshes, is lost in Urre Languen or the Bitter Lake, among the deserts of the interior, about 500 miles from the source.—3. A lake in the S. of Chili, 35 miles long and 5 broad, with an outlet to the Pacific.

Désaix' de Veygoux', Louis Charles Antoine, a celebrated general of the days of the first French Republic, was born of a noble family in Auvergne, August 17, 1768, and entered the army as a second lieutenant at the age of fifteen. Always a skilful and intrepid leader, by 1796 he became commander of a division of the Army of the Rhine, and defended Fort Kehl for nearly two months against the Austrians, until forced to surrender. In 1798 he accompanied Bonaparte to Egypt, accomplishing the conquest of Upper Egypt in about eight months, and from his power of conciliation, as well as his just administration, obtaining from the natives the title of *The Just Sultan.* Returning from Egypt, D. fell, June 14, 1800, at the battle of Marengo, by a musket-ball, while leading a great and ultimately triumphant attack on the Austrian line. A statue to the memory of D. has been erected in the Place Dauphine at Paris. See Beker's *Étude Historique sur Désaix.*

Des'cant, or **Discant** (Sp. *discante,* from Lat. *dis,* 'apart,' and *cano,* 'I sing;' a variation in singing, or part-singing), in music, a second part sung along with, and as an accompaniment to, the plain song or church melody. It was the first form in which the Church seems to have allowed the Gregorian melodies to be harmonised, and was probably introduced from the northern countries, where singing in parts seems to have been natural to the people from very early times. D. was permitted by the Church in the 11th c., and was at first improvised, but gradually came to be written down and developed into *Counterpoint* (q. v.).

Descartes', René, one of the most renowned philosophers of France, was born at La Haye, in Touraine, 31st March 1596, and was the son of a French officer who had fought against the Huguenots. Educated by the Jesuits of La Flèche, he served as a volunteer at the siege of La Rochelle, and afterwards in Holland under Prince Maurice, where he also wrote a treatise on music and some mathematical papers. He next served in Bohemia and Hungary. After wandering for several years through Europe, he settled at Paris in 1626, the year of Bacon's death, and for some time discussed the principles of his new philosophy against the scholastics and peripatetics whom he met at Richelieu's salon and elsewhere. In 1629 he went to Holland, where, under Egmont, greater freedom of thought prevailed, and where he remained for twenty-five years, until Voet, the rector of Leyden, accused him of atheism, when he returned to Paris, and was shortly afterwards invited to the court of Stockholm by Queen Christina, who called him her 'illustrious master.' There he was carried off by pneumonia, 11th February 1650. He died professing the Catholic religion. In 1793 the National Convention ordered his remains to be transferred to the Pantheon. There is a complete edition of D.'s works by Cousin (11 vols. Par. 1824-26), and a convenient selection of the philosophical writings by Jules Simon (new ed. with introduction, Par. 1865). The latter consists of the famous *Discours de la Méthode pour bien conduire sa Raison et rechercher la Verité dans les Sciences* (1637); the *Meditationes de Primâ Philosophiâ* (1641), with D.'s replies to the objections of Gassendi, Hobbes, Arnauld, Caterus, De Mersenne, and others; and *Traité des Passions de l'Âme.* In his *Principia Philosophiæ* (1644) he takes up the subject of general physics, and states his theory of *vortices,* by which he explained the formation of the stars in the centre, and the gradual generation of planets and comets. This theory (which is entirely discredited) has nothing in common with the modern theory of vortex rings in molecular physics. D. applied his 'Method' in three scientific works on Dioptrics, Optics, Meteorology, and Geometry. In the last, he first applied algebra to the geometry of curves, explained the formation of his 'ovals,' and laid down a general rule for the determination of tangents to curves. The Cartesian equation will be found in all works on algebra. In a posthumous work, *Traité de l'Homme et de la Formation du Fœtus,* D. states the theory of animal spirits, or of the nervous system, as a hydraulic mechanism, which Professors Huxley and Clifford have revived as at least an accurate general conception of the automatism of the human body and brain. The same train of thought runs through the treatise of the Passions, in which most grotesque physical explanations are given of the several emotions. As a metaphysician, D. admitted as fundamentally true the idea of self as a thinking substance. All equally distinct ideas would also be true, unless God impressed on them a false appearance. It thus becomes important to prove the existence and the character of God. There must be as much reality in the cause as in the effect; and existence cannot be separated from the idea of the essence of God, for non-existence would be imperfection. In this way mind and matter, being distinct ideas, are proved to be distinct in reality as substances, otherwise God would be wanting in power. This is the famous argument *à priori,* which has been much more logically stated by Spinoza and the Rev. Moses Lowman, but which in substance is as old as the Eleatic school of Greek philosophy. This distinction of mind and matter into substances led to the theory of occasional causes, according to which all phenomena (especially those where matter apparently acts on mind, and *vice versa*) were produced by divine volition, determined by the assemblage of physical or psychical conditions. The courageous scepticism of D. was of good example as a mental attitude, but he added nothing to positive psychology and he introduced into modern philosophy the fallacy that there is an absolute test of truth besides verification by experience. The Scotch Common-sense School have confounded his position with that of Locke and Berkeley, with whom he had nothing in common except the truism that what the mind immediately knows is a mental modification. See Baillet's *Vie de D.* (Par. 1691), and Bordas-Dumoulin's *Le Cartésianisme* (Par. 1843).

Descham'ps, Eustache, a French poet, was born at Vertus, in Champagne, about 1340. He studied at Orleans University, travelled into Italy, Germany, and Hungary, and, according to his own statement, was for some time captive among the Saracens. He was a great court favourite, but always poor, and his property in Champagne was pillaged by the English, whom he heartily abuses in his ballads. He died about 1409. 'He is,' says Besant, 'the most *real* French poet of his century.' His works, comprising 90,000 verses, display grim humour and fierce satiric energy, and give a valuable picture of his times. He resembles Jean de Meun, from whom he occasionally bor-

rows. Professor Morley suggests that Chaucer may have taken the idea of the *Flower and the Leaf* from one of D.'s ballads. See *Poésies Morales de D.*, edited by M. Crapelet (Par. 1832), Besant's *French Humourists* (Bentley, 1873) and *Early French Poets*, and Gidel's *Histoire de la Literature Française* (Par. 1875).

Descen'dants are all those descended from a common ancestor. See COLLATERAL SUCCESSION, CONQUEST, DESCENT, HEIR, SUCCESSION.

Descent'. By the law of England, real property can only be acquired by D. or by purchase. (See PURCHASE OF ESTATES.) D. or hereditary succession is the title by which real property devolves by law on the heir from his ancestors. D. at common law is lineal or collateral. Lineal D. is from the father to son, and from son to grandson, and so on. (See COLLATERAL SUCCESSION.) The person next in the line of succession is the Heir-Apparent (q. v.), or the Heir-Presumptive (q. v.).

Des'eret. See UTAH.

Des'ert (Lat. *desertus*, 'solitary,' 'waste'), the general name of a flat, unproductive region, or uninhabited wilderness. According to Ami Boué, a D. properly so called always indicates the site of a large gulf or inland sea of comparatively recent geological time. Although the word is specially applied to the Sahara (q. v.), a D. is not necessarily a sandy waste, but may bloom with vegetation like the prairies, llaños, pampas, and selvas of America. Other varieties are the salt plains, as of Cashgar (q.v.), and stony or rocky deserts, like those of Arabia, Labrador, Patagonia, &c. One of the characteristics common to all 'deserts where no men abide,' is the scarcity of food and water. It is impossible to say, notwithstanding what has been done in Algeria, whether the discovery of the Artesian Well (q. v.) will ever materially augment the number of oases. As affecting the conditions of climate, the D. plays an important part, acting, so to speak, as a great heat-reservoir. It was calculated that, had the Sahara been flooded, as projected in 1875, there would have followed a fall of several degrees of the temperature of S. Europe. Mineral riches are not unfrequently found in waste regions, as in the case of the 'D. of Atacama,' in the N. of Chili, where valuable deposits of silver and copper have been discovered of late years. See G. von Humboldt's *Ansichten der Natur* (3d ed. Stutt. and Tub. 1849).

Deser'tion, in martial law, is the offence of a soldier or a sailor quitting the army or the navy without being discharged or having leave of absence. By the annual Mutiny Act, military D. is punishable with death, or such other punishment as a court-martial may award. Inducing any one to desert from the army was formerly punishable with death. The punishment is now, by statute, penal servitude. In the navy, by the Articles of War, 'every person who shall desert, or entice others to do so, shall suffer death, or such other punishment as a court-martial shall think fit.' In the merchant service a seaman who deserts the ship forfeits his wages, and renders himself liable to imprisonment. But it is not held to be D. if the seaman forthwith enter into Her Majesty's service. Neither is it D. if the master compel the seaman to quit the ship by harsh treatment.

Desertion of Spouse. In England, under the Divorce and Matrimonial Causes Acts, a sentence of Judicial Separation (q. v.) may be obtained by husband or wife on the ground of Adultery (q. v), cruelty, or desertion without legal cause, for two years and upwards. A wife deserted by her husband may, by application to the proper authority, obtain an order to protect any money or property which she may become possessed of against her husband or any one claiming in his right. During the continuance of the protecting order the wife is, relative to property and contracts, on the same footing as if she had obtained a decree of judicial separation.

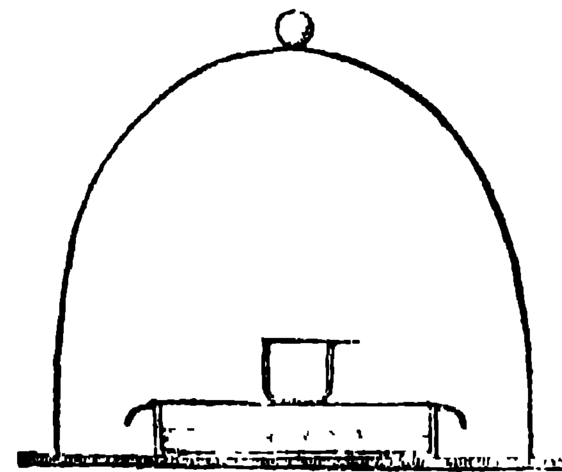
In Scotland, wilful D. on the part of husband or wife of the other may be the ground of an action of adherence or of divorce under the statute of 1573, c. 55. If the wife desert her husband she forfeits her claim to Aliment (q. v.). It is questionable if she would, on his death, have a right to Terce (q. v.), the statute enacting that offenders shall 'tyne and lose their tocher, *et donationes propter nuptias*.' An offending husband must restore to the wife her *tocher*, and fulfil to her all provisions, legal or conventional. As in England, a wife deserted by her husband can now in Scotland obtain protection of her earnings or other acquisitions; but the process for obtaining it is more difficult in Scotland than in England.

Desertion of the Diet. See DIET, DESERTION OF.

Desertion of a Tenant. In Scotland, when a tenant neglects to cultivate his land, the landlord is entitled to eject him, and to resume possession. The action is valid by common law, but as the fact of D. may be questionable, the action ought to be laid on the Act of Sederunt of 1756.

Desicc'ants (from Lat. *desicco*, 'I dry up') are medicines used to dry up some watery secretion by being dusted over a part.

Desicca'tion is the process of drying. The desiccator is an apparatus much used in chemistry and physics, and usually consists of a bell jar placed over a vessel containing sulphuric acid or chloride of calcium; this vessel is covered with wire-gauze, and on the gauze is placed the substance or apparatus to be dried. Owing to the strong attraction for water possessed by the two substances mentioned, complete D. is rapidly accomplished.


Desiccator.

Design' (Lat. *designo*, 'I mark or trace out') denotes, in a general sense, any intention, scheme, or plan of action. That which bears traces of constructive forethought is said to be a work of D. Hence the adaptation of means to ends observable in nature, and the general harmony and order of the universe, have been advanced as confirmatory evidence of an intelligent designer. This argument is admirable as an inference from the character of the effect to the nature of the cause; but it postulates a belief in the divine existence. See Paley's *Natural Theology*, the *Bridgewater Treatises*, the *Burnett Prize Essays*, and Ueberweg's *History*, i. 383.

Design, in art, signifies either a tentative sketch, or the composition of subject-matter, as opposed to the execution of a finished picture. In the latter sense, the ancient Greek sculptors and the great Italian painters excelled in the striking boldness and exquisite grace of their designs, as seen especially in the marbles of the Parthenon, in the statues of Michael Angelo, and in Raffaelle's famous cartoons.

Design, Schools of. See SCHOOLS OF DESIGN.

Designs, Copyright in. This is mainly regulated by the Designs Act, by which the grant of copyright is given to any original design, whether applicable to the ornamenting of any article of manufacture, or of any substance, artificial or natural, or partly artificial and partly natural. The application of the design is not necessarily for protection to be within the United Kingdom; and the protection is given though the inventor and proprietor be foreigners. See COPYRIGHT, LAW OF.

Do'sio, a town in the province of Milan, N. Italy, 11 miles N. of Milan, and a station on the Milan and Como Railway, lies in the midst of gardens and vineyards, and is beautified by fine trees and fountains. Pop. 5500, engaged for the most part in tillage and the breeding and pasturing of cattle.

Desirade', or **Desëa'da,** one of the Leeward Islands, W. Indies, belonging to France, 6 miles long and 2 broad. It lies 4 miles E. of Guadeloupe, of which it is a dependency. Pop. (1871) 1637. D. was the first island discovered by Columbus in his second voyage, 1493.

Des'man. See MUSK RAT.

Desmid'ieæ, or **Desmidia'ceæ,** a natural order or sub-order of green-spored (chlorospermous) Algæ, remarkable for their mode of reproduction and many curious forms. 'The more typical species of the group,' writes Mr Berkley, 'as the name implies, consist of a chain of connected joints, increasing by the continued addition of two new half-joints in the centre, so that the two extreme members of the chain are the oldest, and the two in the centre the youngest. In the majority of instances, how-

ever, the disarticulation takes place on the formation of the first new half-joints, in such a manner that the two new individuals consist of half the old plant connected with half of the new, a mode of increase which obtains also in the *Diatomaceæ* (q. v.). Fructification takes place, though rarely, by the conjugation of two individuals by means of lateral tubes or simple contact, as in *Conjugatæ*, the spore affecting interesting forms, and being often strongly spinulose, the spines being occasionally complicated in structure. The new individual is produced from this by the formation of a vertical partition in the centre, and the subsequent formation of two new half-joints, so that the proper form of the species is not attained till the third generation, if so soon.' D. differ from *Diatomaceæ* in their green colour and the absence of silex; hence they shrivel up and lose their natural form in drying. Pools and running streams are their favourite habitats; they are sometimes found in brackish, but never in salt water. None are applicable to any economic purpose. See CONJUGATION and SWARMING.

Desmon'cus, a genus of tropical American palms, resembling the calami in general appearance. *D. macracanthos*, the Jacitara, a common species of the Amazon or Rio Negro, owing to the sharp curved spears in the leaf-stalks, obstructs the traveller by catching hold of his garments. The Indians manufacture various implements of it; among others, the strainers used in squeezing the mandioc juice are plaited out of strips of the stem.

Desmou'lins, Camille', one of the most typical and brilliant of the early French Revolutionists, was born at Guise in Picardy, in 1762, and studied for the bar, but never practised. He was seized with the revolutionary fever, and wrote some works advocating the establishment of a republic in France of the ancient or classical type. D.'s fiery utterances were mainly instrumental in leading the population to destroy the Bastille on the night of the 14th July 1789. His first idol had been Mirabeau, but after the death of the latter he attached himself to Danton. Next to Danton and Marat he was the most influential member of the Cordeliers Club. He became a member of the National Convention, voted for the death of Louis XVI., and although in reality more in sympathy with the Girondins than with the Jacobins, pelted the former with ridicule, of which he was a master, in his *Histoire des Brissotins*. After he saw what excesses the reign of the Terrorists was leading to, he attacked the members of the Committee of Public Safety. In consequence he was arrested, along with Danton, March 30, 1794, and was executed with him, April 5, saying, when asked his age, that 'he was of the same age as the *bon sans-culotte* Jesus, thirty-three years, an age fatal to Revolutionists.' A fortnight afterwards his wife, Lucile D., who had attempted to arouse popular feeling in his favour, was also executed. D. was a writer of powerful imagination and great humour, although deficient in moral resolution; in quieter times he might have been a great wit, if not a great poet. An edition of his works appeared in the *Bibliothèque Charpentier*. See *Camille D., Lucile D., Étude sur les Dantonists*, by Jules Claretie (Par. Plon, 1875), and an English translation of his Memoirs (Lond. 1876).

Des'na, a river of Russia, an affluent of the Dnieper. It rises 50 miles S.E. of Smolensk, traverses the governments of Smolensk, Orel, and Tchernigov, and after a course of more than 500 miles, falls into the Dniper near Kiev. It is navigable to Briansk.

Des'potism (from Gr. *despotēs*, 'lord or master') is a form of government having its origin in superstition, under which the welfare of a community is subordinated to the interests of a class or individual. In the latter case, if the individual clothed with 'the divinity that doth hedge a king' is of a strong moral and intellectual nature, the form of rule is not without something to recommend it. Under the direction of one wise man the practical force of a people is greater than when they are free. This fact was acted on by the ancient Romans, by the creation of a Dictator (q. v.) in times of great public peril. England was, perhaps, never so powerful as when its whole energy was directed by the wisdom and iron will of Oliver Cromwell. Nevertheless a free form of government is to be preferred; the despotism of a weak or narrow-minded ruler being an unqualified evil.

Dess'alines, Jacques, one of those extraordinary characters whom the circumstances attending, or following, the French Revolution brought into prominence, was born about 1760, on the Gold Coast of Africa, and became a slave to a free black in St Domingo. After the liberation of the slaves there in February 1794, he took an active part in the disturbances that occurred in the colony. He became lieutenant to Toussaint l'Ouverture, and, after his capture, leader of the insurgents, and finally drove the French out of the island, October 1803. When the people declared themselves independent, D. was proclaimed Emperor of Hayti, under the title of Jean Jacques I. His tyranny and cruelty, however, provoked hatred, and on the 17th October 1806 he fell a victim to a conspiracy by a negro named Christopher (q. v.), who succeeded him as Emperor Henri I. of Hayti.

Dessau', a town of Northern Germany, capital of the Duchy of Anhalt, on the left bank of the Mulde, about 3 miles above its confluence with the Elbe, and 80 miles S.W. of Berlin by rail. It is walled on three sides, and protected on the fourth by the river. Its principal building is the ducal palace (1748) with a picture gallery and an extensive library containing numerous MSS. of Luther. The manufactures are woollen and linen cloth, leather, hosiery, and tobacco. Pop. (1871) 17,459. Mendelssohn was a native of D.

Destina'tion, in Scotch law, the series of heirs called to the succession of heritable or movable property by provision of law, or to movable property under a will, is termed a D.; but the term is usually limited to a nomination of successors under a will. For rules of succession in heritable and movable property by provision of law, see SUCCESSION. For rules as to destination of movables by will, see LEGACY, TESTAMENT, LEGITIM, JUS RELICTÆ. By the law of Scotland heritage cannot be conveyed in form of a last will and testament. Regarding execution of a settlement, including heritage as well as movable estate, see article WILL. An absolute proprietor of heritage is under no legal restraint as to the distribution of his property. He may put a daughter in place of a son, or a younger child in place of an elder one, or he may exclude all his children in favour of some one else.

Destruc'tion of Rec'ords, Wills, and Writings. In England, by 24 and 25 Vict. cap. 96, if any person steal, or for any fraudulent purpose take away or injure any writing belonging to any public office, or belonging to any civil or criminal law process, he is liable to penal servitude for three years. By the same Act any one who fraudulently conceals, cancels, or destroys any testamentary writing is guilty of felony, and liable to penal servitude for life.

Desu'etude (Lat. *desuetudo*, 'disuse'), a term of Scotch law indicating the legal doctrine that a statute may lose its force by the gradual establishment of usage contrary to its provisions, without these being repealed by the legislature. Mere non-usage, however, even for the greatest length of time, will not abrogate a statute; continued intention of the community to repeal by contrary practice must be shown. In England the rule of law is that a statute remains in force, however unsuited to the altered condition of society, until repealed expresssly, or by implication, by another statute. In the latter case, the repeal, according to Blackstone, 'is to be understood only when the matter of the later statute is so clearly repugnant that it necessarily implies a negative. As, if a former Act says that a juror upon such a trial shall have an estate of £20 a year, and a new statute afterwards that he shall have 20 marks. For a remarkable instance of the extremity to which this doctrine of English law has been carried in recent times, see article BATTEL, TRIAL BY. Since 1869 an edition of the English statutes has been published, containing only those statutes, or parts of statutes, which are in force. The rule of D. in Scotland applies only to statutes made previous to the Union, and even to them its application is uncertain.

Detach'ment (Fr. *détachement*, from *détacher*, 'to disengage'), in military language, a comparatively small number of troops detached from the main body for some special duty. In naval language, also, a D. of one or more ships under a separate command is spoken of.

Detain'er, in English law, the name of a writ which lay against prisoners in the Marshalsea or Fleet Prison, directed to the marshal or the warden, directing him to detain the prisoner until lawfully discharged.

Deter'minants, a symbolic method of modern mathematical analysis, by which, among other things, the solution of equations

of several unknown quantities becomes a mere matter of inspection. A determinant may be defined as the algebraic sum of all the possible products obtained by permuting the suffixes of the expression $a_1b_2c_3d_4$..., the sign being changed for every *single* permutation. Thus the determinant of the third order is

$$a_1b_2c_3 - a_1b_3c_2 + a_2b_3c_1 - a_2b_1c_3 + a_3b_1c_2 - a_3b_2c_1,$$

and is usually written thus :—

$$\begin{vmatrix} a_1, & b_1, & c_1 \\ a_2, & b_2, & c_2 \\ a_3, & b_3, & c_3 \end{vmatrix}$$

The properties of D. are very numerous ; but for these the student is referred to works on the subject, such as Salmon's *Higher Algebra*, Dodgson's *D.*, and Balzer's *Theorie und Anwendung der Determinanten*. A short treatise, with some of the commoner applications, is also given at the end of Todhunter's *Theory of Equations*.

Det'inue, in English law, the name of an action against one who refuses to restore goods intrusted to him. (See DEPOSIT, and the articles there referred to.) The action of D. has been almost wholly superseded by the more convenient one for the plaintiff of *Trover*.

Det'mold (originally *Theotmalli*, 'the people's *mall* or place of assembly'), the capital of the principality of Lippe-D., Germany, on the Werra, E. of the Teutoburger-Wald, and 47 miles S.W. of Hanover. It consists of an old and a new town, and is encircled by pleasant promenades. The principal buildings are the palace, the gymnasium, and the theatre. There are several charitable institutions, a military hospital, and a public library, established in 1781. D. is supposed to be the ancient *Teutoburgium*. On the Grotenburg, about two miles from D., is the Hermann Memorial, a colossal copper statue erected to the memory of Hermann or Arminius, who defeated Varus and his legions (B.C. 9). Pop. of D. (1871) 6469.

Detona'tion signifies a sudden explosion.

Detri'tus (Lat. 'worn down'), in geology, denotes a natural accumulation of debris or fragments of disintegrated rocks.

Detroit' (Fr. 'the strait'), the chief city of Michigan, stands on the right bank of the D. river, opposite Windsor, in Canada, 526 miles N.W. of Washington. The city extends along the river several miles, and the site rises gradually to a height of 40 or 50 feet. Its chief public buildings are the courthouse, customhouse, post-office, the Roman Catholic cathedral, the insurance bank, and the churches. D. is the great centre of commerce, banking, and produce in the state, railroads connecting it with all parts of the States and Canada, and the river giving it the unequalled waterway of the lakes. The industry comprises many steam sawing-mills, shipbuilding, foundries, with copper-smelting in the vicinity. D. has a medical college, St Philip's College, and many public and private schools. In 1858 the debt was $300,000, and the assessed value of property $16,360,000. In 1875 the debt was $2,382,900, and the assessed value $90,000,000. D. was first visited by the French in 1610, settled by them in 1701, and taken by the British in 1760. Pop. (1870) 79,577 ; (1875) 101,083.—*Detroit River* flows S. from Lake St Clair 25 miles to Lake Erie, with a breadth of three-quarters of a mile, and is deep and navigable.

Dett'ingen ('the people's home or town'), a village of Lower Franconia, Bavaria, on the right bank of the Main, about 8 miles N.W. of Aschaffenburg, notable only for the victory gained here on the 27th of June 1743 by the allied army of English, Hanoverians, Austrians, and Hessians, amounting to 40,000 men, and commanded by George II. of England, over the French, 58,000 strong, under the Duc de Noailles. The latter lost 2659 men, and the allies at least as many. The battle of D. was the last occasion in which an English sovereign appeared on the field. See Carlyle's *History of Friedrich II. of Prussia*.

Deuca'lion (the 'bright' or 'brilliant'?), in Greek mythology, a king of Phthia, and son of Prometheus and Clymene. When Zeus, to punish the wickedness of men, had sent a flood over Hellas, D. with his wife Pyrrha entered an ark, previously prepared on the advice of his father, and they alone were saved. On the ninth day the ark rested on Mount Parnassus. There D. sacrificed to Zeus, who sent Hermes to grant any prayer he might offer. Having prayed for the restoration of the human race, he and his wife were ordered to cover their heads, and cast their mother's bones behind them as they went their way. Judging that the earth was their mother, they cast stones behind them, when those thrown by D. became men, and those by Pyrrha women. D. is the father of Hellen, from whom sprang the Hellenes or Greeks, and of Protogeneia ('the first-born'). Cox, in his *Manual of Mythology*, finds in the names evidence of the mythic perversion of solar phenomena.

De'us ex Mach'ina, a phrase used by the ancients in allusion to a practice not unfrequent in the classical theatre of bringing about the solution of a difficulty in the plot by the intervention of a god, who descended on the stage in a kind of machine. Horace (*Ars Poetica*) obliquely censures the abuse of this unskilful artifice—

> 'Nec Deus intersit, nisi dignus vindice nodus
> Inciderit.'

The phrase has been borrowed by the moderns, who have given it, however, a wider application.

Deuteron'omy (Gr. 'the second law') is the fifth book of the Bible. According to Jewish and Christian tradition, it was, like the rest of the Pentateuch (q. v.), the composition of Moses. It is almost entirely made up of discourses of Moses to the people regarding the way in which Jehovah had guided them through the desert, and setting forth anew his commands ; the only historical part, with the exception of iv. 41–43, being the last four chapters. Modern critics endeavour to prove that the aim of the author was not historical, but hortatory with reference to the circumstances of his own time—about the time of Hezekiah and Josiah, if not as late as the Babylonian exile—to suit which he brought prominently forward those laws which were then needed, altered some of the earlier ones, and gave new ones altogether ; which treatment is shown particularly in the laws relating to the priests and Levites, and the offering of sacrifices in one place. See Bleek's *Einleitung in die Heil. Schrift* (Berl. 3d. ed. 1870).

Deut'zia, a genus of plants of the natural order *Philadelphaceæ*, many of which are cultivated in our greenhouses. They are natives of India, China, and Japan. The leaves of *D scabra* of Japan is covered with siliceous star-shaped hairs—favourite objects under the microscope—and are used by wood-polishers in Japan. Similar hairs are seen on *D. staminea*.

Deux Ponts. See ZWEIBRÜCKEN.

Dev'aprayа'ga, a town in the feudatory state of Gurwhal, Hindustan, 12 miles W. of Srinnuggur, in the fork of the Aluknunda and the Bhagiratti, henceforth named the Ganges, the part of which deemed most sacred by the Hindus being at D. Hence it is the resort of numerous pilgrims, but its fixed population consists of 1000 Brahmans. In the upper part of the town is a temple 60 feet high, built of large blocks of squared stone piled up without mortar. Three basins have been excavated in the solid rock below the level of the stream. D. is 2266 feet above the level of the sea.

Devel'opment of Doc'trine is related to, but not to be confounded with, the Roman Catholic doctrine of Tradition (q. v.), according to which there is a supplementary revelation over and above that contained in the Bible, and which has been handed down outside of the Scriptures. A certain theory of D. of D. is indeed held by some Roman Catholics, namely, that although the doctrines of Christianity are all in the Scriptures, they are there only in their rudiments, and that the Church, under the tuition of the Spirit, comes to understand all that these rudiments imply, and to expand them in their fulness. The orthodox Protestant doctrine is, that 'all the facts, truths, doctrines, and principles which enter into Christian theology are in the Bible, as fully and clearly at the beginning as they are now.' Still progress has been made in theological knowledge as well as in physical science. As the science of astronomy, for example, is always advancing, while the structure of the heavens remains ever the same, so the Bible, which contains the great truths of revelation, is always becoming better understood, and the representations of the early fathers regarding, for example, the doctrine of the Trinity, as compared with the clear, precise, and consistent statements in the creeds of the Church, are like the astronomy of Pythagoras compared with that of La Place. Another theory, initiated by Schleiermacher, and founded on the

philosophy of Schelling and Hegel, is that humanity is a generic life which, assumed into union with the divine life of the Son of God, and thus raised to a higher power, is communicated from him by a natural process of development to the Church, and that Christian theology is not the systematic exhibition of what the Bible teaches, but the interpretation of this life. Without regard to any theory, the D. of D. seems to be the change which the definitions of doctrines teaching certain essential truths continually undergo partly at least under certain external causes, such as differences of climate, national character, personal feelings and passions, court intrigues, priestly imposition, the fanaticism of monks, and the internal principles of human reason. See Donaldson's *Critical History of Christian Literature and Doctrine from the Death of the Apostles to the Nicene Council* (Edinb. 1864).

Development of the Em'bryo. To this subject belongs the consideration of the changes which the egg of an animal or

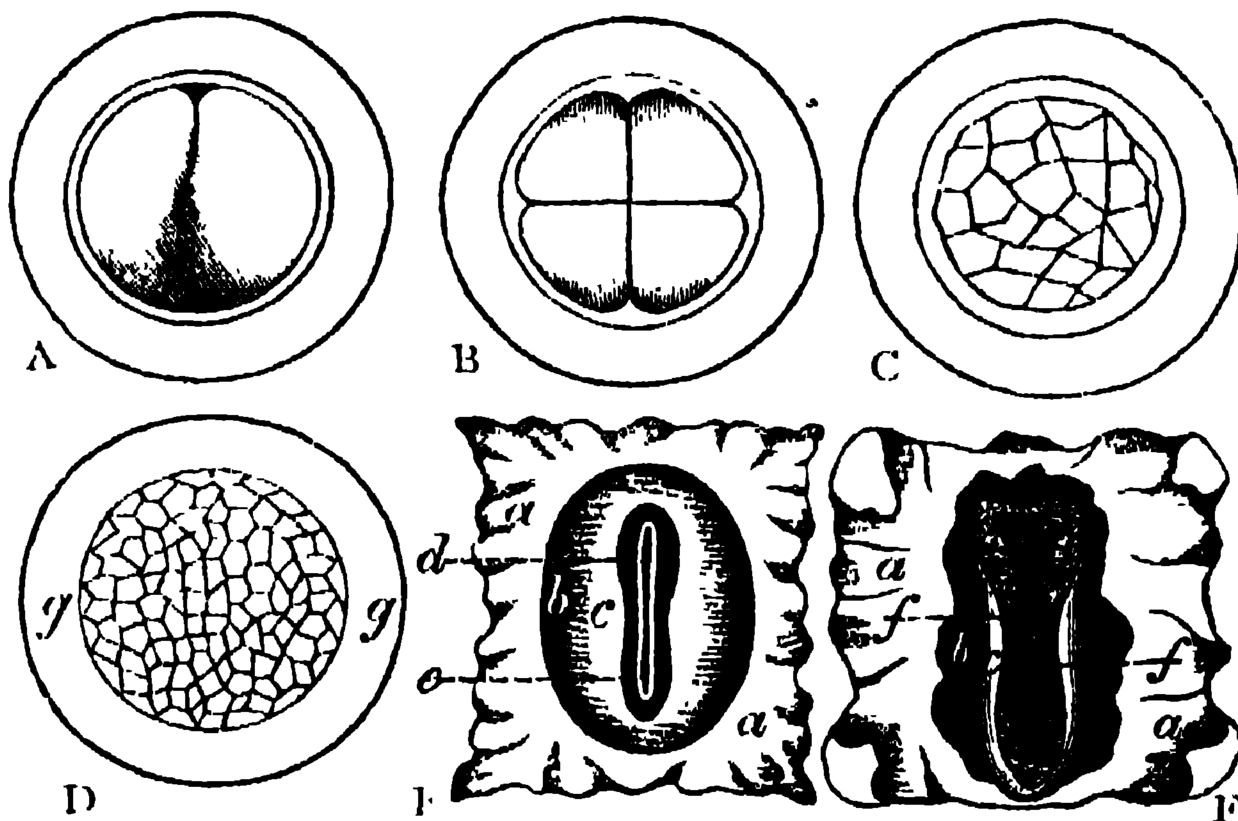


Fig. 1.—DEVELOPMENT OF MAMMALIAN OVUM.

A, First stage of segmentation of mammalian egg, showing its division into two halves B, Second stage, in which the two primary segments are divided to form four C, More advanced stage, in which the process of division has produced numerous segments. D, Complete segmentation of egg, known as the 'mulberry-like condition;' *g g*, 'zona pellucida' or 'vitellary membrane' E, Progress of development as seen in ovum of dog (after Bischoff): *a a*, germinal membrane; *b*, area vasculosa; *c*, area pellucida; *d*, dorsal laminæ; *e*, primitive groove, bounded by the substance from which the cerebro-spinal nervous system is formed. F, Further development of E (Bischoff): *a a*, *b b*, layers of germinal membrane; *c*, area vasculosa; *d d*, dorsal laminæ; *e*, placed on primitive groove, showing at its upper portion a dilatation corresponding to the primitive divisions of the brain; *f f*, vertebral plates or rudimentary vertebræ.

the seed of a plant undergoes in its progress from its immature form to assume either directly or indirectly the likeness of the parent-form. The *ovum* or egg of any animal furnished by the female organs of reproduction requires to be fertilised or impregnated by contact with the male element or spermatic *fluid*. As the result of this impregnation, which may take place either within or without the female body, the embryo, when placed amid suitable conditions, develops into the perfect form. Regarding the subject of animal development as a whole, Von Baër long ago laid down the grand law that development proceeds '*from the general to the special*'—in other words, that in the development of the eggs of all animals a certain common track was pursued at first, and that from this common point the process of development tended to diverge more or less widely, according as the egg belonged to an animal form high or low in the scale. This expression of the specialisation of the process of development is known as Von Baër's law; and as exemplified in each sub-kingdom or type of animals, it is seen that all the members in their development present at first a common or *general* type of form, which, however, as development proceeds, diverges in each individual case more or less typically, and in a manner corresponding to the rank of perfection in which the adult forms show. Von Baër's law tended to correct a notion, long since exploded in its typical aspect—but likely to become revived by evolutionary views of the relations of living beings—that the embryo, say of a Vertebrate animal, passed in its development through phases, each of which corresponded to a lower type of animal life. A vertebrate embryo would thus first correspond, it was maintained, to a protozoön, then to a cœlenterate, or radiate, then to an articulate and a mollusc, and would only finally assume the perfect vertebrate form. This view is without foundation; no such panoramic view of lower types being seen in the vertebrate course of development. The influence of Mr Darwin's researches and views, it may be noted, has undoubtedly been to reinstate a form of this old belief in the favour of naturalists. Thus, believing that the various groups of animals are descended from one another by true generation, it is easy to conceive that in the development of any form, stages should be perceived corresponding to the various ancestral modifications through which the developing organism attained its own and present aspect. Development, or embryology, in this view, and to quote Mr Darwin's own words, 'rises greatly in interest when we look at the embryo as a picture, more or less obscured, of the progenitor, either in its adult or larval state, of all the members of the same great class' (*Origin of Species*, 6th ed. p. 396).

The process of *development* in each of the great groups of animals will be fully discussed in the articles which relate to these

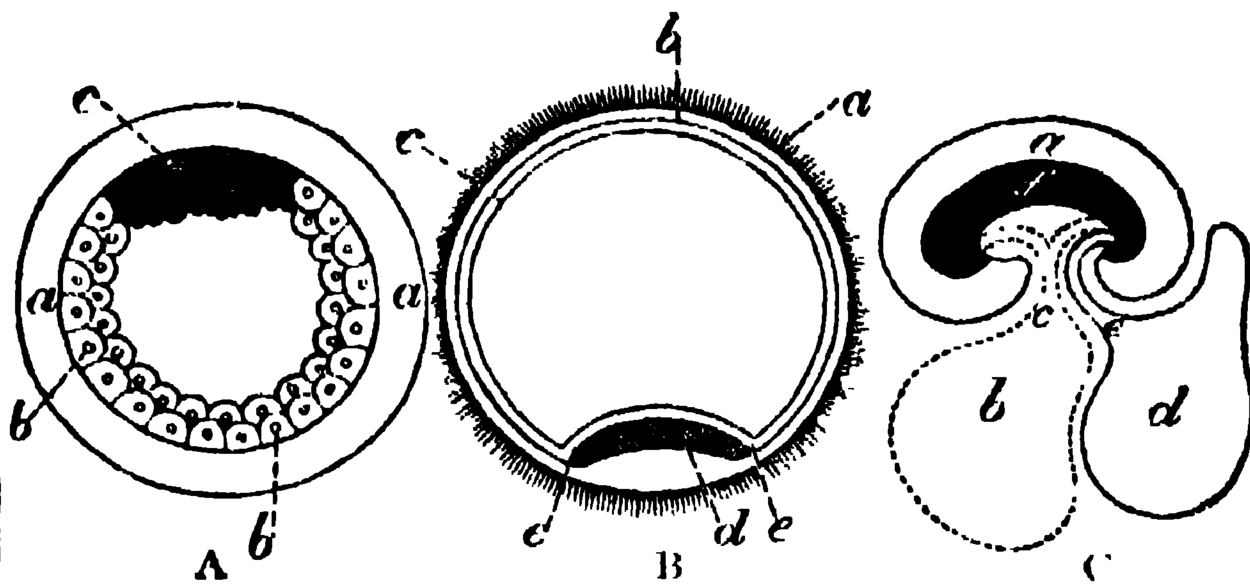


Fig. 2.—DEVELOPMENT OF MAMMALIAN OVUM

A, Formation of 'blastoderm' or germinal membrane (*b b*), after complete segmentation, and appearance of germinal area (*c*); *a a*, vitellary membrane B, Further development of ovum, showing vitellary membrane (*a*), covered with villosities, and constituting the 'chorion;' *b*, cutaneous or serous layer of germinal membrane; *c*, mucous layer of germinal membrane; *d*, further development of germinal area to form the embryonic mass, *e e*, elevation of serous layer to form the dorsal laminæ. C, Relation of the embryonic sacs: *a*, inner layer of amnion, immediately investing the embryo (*f*); *b*, umbilical vesicle with its 'vitelline' duct (*c*); *d*, allantois and its duct or 'urachus' (*e*), which afterwards becomes the urinary bladder; *f*, embryo. (The figures are purely diagrammatic.)

groups (see PROTOZOA, CŒLENTERATA, ECHINOZOA, &c.); but the more general features in the development of animals may be briefly sketched in the present instance. In the lowest group or *Protozoa*, in which the occurrence of true or sexual reproduction is denied by many zoologists, development is hardly specialised at all. At the most (as in *Infusoria* and *Gregarinæ*, &c.), the egg or developing body undergoes a process of internal division, corresponding to the *segmentation of the yolk* (Fig. 1, A, B, C, D) in higher animals. The egg then ruptures, and the contained or divided segments escape, and require but little further change to convert them into forms similar to their parent organisms. In Cœlenterates, and it may also be noted in sponges, the egg first appears to undergo a process of segmentation or division of its internal parts. These parts or cells next coalesce to form the *blastoderm* (Fig. 2, A, *b*, *b*) or primitive *germinal membrane*, out of which, in all animals, the subsequent parts of the embryo are evolved. And in Cœlenterates this blastoderm appears simply to separate into two layers—the outer of which becomes the *ectoderm*, or outer wall, and the inner the *endoderm* or inner wall, of the equally simple cœlenterate body. In Annulosa and Mollusca (q. v.) the egg undergoes a similar process of segmentation, the embryonic body reaching a higher degree of specialisation, and developing distinct *hæmal* (blood) and *neural* (nervous) regions. Broadly speaking, in the latter cases, the *serous* or outer layer (Fig. 2, B, *b*) of the blastoderm gives origin to the organs of animal life (nervous system, &c.), whilst the inner or *mucous* layer (Fig. 2, B, *c*) develops the digestive or alimentary tract and other organs.

Coming next to the *vertebrate* group of animals, in which the process attains its highest phase, we may note that the egg (see

OVUM) consists (as in lower forms) of an outer (*vitelline*) membrane, of the enclosed *vitellus* or *yolk*, and of the *germinal vesicle*, with its included *germinal spot*. The egg of the bird presents an example of a familiar and readily accessible kind for the study of vertebrate development. It consists of an outer porous *shell*, through which air may pass out and in during the D. of the E.; of a *shell membrane*, lining the shell; of the *albumen* or white, arranged in layers; of the two twisted ends or *chalazæ*, one at either end of the egg, and which serve to protect the yolk from shock or injury; of the *yolk*, enclosed in its *vitelline membrane*; and of the *blastoderm* or *cicatricula*, lying on the upper surface of the yolk. This latter is the actual seat of the changes in development, and, it must be noted, has been formed, as above described, by the process of fecundation which has taken place within the hen's body, and before the egg was laid. Thus the hen's egg, as it is usually seen, contains the embryo, which has already undergone the stages corresponding to the yolk-segmentation common to all animals, save, perhaps, the protozoa. The egg or ovum, before being laid, indeed, exhibited the parts above noted as common to the egg of all animals; but the essential part of this egg alone undergoes the process of segmentation, and the *blastoderm* or *cicatricula* of the fully formed egg, enclosed in its yolk and white, comes therefore to represent in itself the true and actual embryo of the bird. All the other parts (yolk, white, &c.) are merely accessory structures. The blastoderm of the egg appears to possess an outer white rim or edge, containing a circular area of transparent kind, which in turn contains an opaque space. Beneath the cicatricula the yolk mass is less solid, and assumes a flask-shaped appearance. The blastoderm itself exhibits a composition of two layers, an upper one (*epiblast*) or serous layer, composed of small granular cells, and an under layer (*hypoblast*) or mucous, of larger cells, whilst a middle layer (*mesoblast*) or vascular layer is afterwards developed. The vertebrate characters become early impressed upon the developing embryo, by the formation, in the dorsal or upper part of the blastoderm, of the *primitive groove* (Fig. 1, E *e*), in the floor of which the *Notochord* (q. v.), or early representative of the spine, is formed. Soon the vertebræ are developed on each side of this groove, which, meanwhile, becomes a canal, enclosing the future spinal cord. The outline of the body is now also beginning to be formed, and at the end of the second day of incubation the vascular layer of the blastoderm develops a little pulsating point, the *punctum saliens*, or primitive heart. The serous layer forms the *amnion* (Fig. 2, C *a*), which is fully completed by the fourth day, and the mucous layer duly gives origin to the abdominal organs. About the sixth day of incubation the bird-like characters of the embryo begin to be more marked. At the tenth day the yolk diminishes in bulk, and rapid growth occurs from the eighth to the tenth day inclusive. Feathers are developed, beginning at the ninth or tenth day, and the beak and toes are well developed at the sixteenth day. The bones begin to be ossified from their cartilages about the eighth or ninth day (Von Baer). At the fourteenth day the chick shifts its position and lies lengthways in the egg, and on the twentieth day or so, the beak is thrust through the shell-membrane, and the bird, leaving behind it the useless parts of the amnion, allantois, and chorion, emerges into the world. Development and reproduction are said to be *oviparous* when they take place, as in the bird, *without* the parent's body. When the eggs are retained within the body of the parent (as in some snakes, &c.) until the young are hatched, the animal is said to be *ovi-viviparous*; and when the eggs are not only fertilised within the body of the mother, but are wholly developed therein, development is said to be *viviparous*. See also METAMORPHOSIS and REPRODUCTION.

Development Theory. See SPECIES.

Dev'enter, commonly **Dem'ter** (Lat. *Daventria*), an ancient town in the province of Overyssel, Holland, on the Yssel, 55 miles E.S.E. of Amsterdam, fortified by a wall and ditch. The principal buildings are the townhouse, courthouse, and prison. D. has numerous hospitals and several high-class educational institutions. The chief industries are iron-foundries and the manufacture of Turkey carpets and hosiery. D. exports butter, grain, beer, and a celebrated gingerbread known as 'D. cake' (*D. Koek*). Pop. (1869) 17,610. D. was destroyed by the Saxons in 778, and again by the Norsemen in 883, and was made an imperial fortress by Lothar of Saxony in 1123. During the middle ages it was a famous Hanse town, and in the 16th c. ranked after Antwerp and Amsterdam as an emporium of trade, and is still flourishing, though neither so famous nor so conspicuous as formerly.

Devia'tion of a Ship. Under the contract of affreightment, if a vessel be compelled by weather, by an enemy, or by accident, to deviate from the appointed line of voyage, no claim arises to the freighter against the owners; and it is now held that the master may detain the cargo, though formerly the rule was that he was bound to forward it in another ship. An unnecessary D., being an alteration of risk, discharges the underwriter. The *onus probandi* lies on the person alleging D.

Device', in heraldry, an emblematic design, borne upon armour or on banners. The term is derived from the *vestialla divisa*, or parti-coloured uniforms by which Italian retainers were distinguished in the 13th c. Devices were used to mark different warriors early in the middle ages. Henry II. bore the D. of the broom-plant, or *planta-genista*, as emblem of his name, Plantagenet. The devices of the Houses of York and Lancaster—the red and white roses—became famous in the civil wars. In the 16th c. painted or carved devices were very common in noblemen's dwellings.

Dev'il (Gr. *diabolos*, 'traducer'), in Christian theology, is a personal evil spirit, the cause of all evil, and the active enemy of God and man. One of the first tasks of man's imagination, in his primitive state, is to account for the phenomena of nature. On the one hand there appears to be a beneficent power, who scatters welcome gifts upon men; on the other, a harsh and cruel power, that covers the sky with blackness, sweeps away his home with torrent or tempest, starves, freezes, or scorches him, poisons him with exhalations, casts him to the beast of prey: 'One a god of light smiling in the sunbeam, the other a god of darkness scowling in the thunder-cloud; the one ruling by good and gentle spirits, the other by fierce and evil spirits.' Here we have the origin of the dualism, or worship of two gods, which prevailed among the ancient Indians, Persians, Egyptians, and many other nations; for instead of the good deities alone being worshipped, as might be supposed, the terrible gods were more adored than they, from fear of their vengeance.

The monotheism of the Hebrews lifted them far above the perplexities of the dualistic idea. Belief in a D. nowhere appears in the earlier books of the Bible. In Genesis the serpent which tempted Eve is not represented as a great being hostile to God, though in later times that interpretation was accepted as the only adequate explanation of the phenomenon. After the captivity the D. was discovered under the disguise of the serpent (Wis. ii. 23, 24), the symbol of the Persian Ahriman. Neither is there any dualism implied in the ceremonial connected with Azazel (Lev. xvi. 8, 10, 'scapegoat'), for he is not a personal being, and the goat is not offered to him; he is merely a personification of abstract uncleanness; although the prototype of Azazel is the Egyptian Set. The first definite appearance of the doctrine afterwards so fully developed is in the Book of Job. According to the introduction of this book, among the 'sons of God' who surround Jehovah's throne there is a Satan (Heb. 'adversary'), whose part it is to speak against man, and bring misfortunes on mankind, but who seems as much a servant of God as the other angels. A slight development of the idea appears in the prophecies of Zechariah, where Satan, although still merely the accuser, is rebuked for his attack on Joshua, the high-priest, and on Jerusalem; so that he is already beginning to be opposed to Jehovah. It is at this point that the influence of the Persian dualism which took effect during the captivity appears. The Jews, of course, did not adopt the dualism of that religion. The grand idea that Jehovah shaped and directed all things was so strong in them that they did not recoil from the consequence that not only plagues and disasters, but even moral evil, must be in some deep, mysterious way the work of God; and on the part of some of the nobler-minded prophets there was a direct protest against the dualistic notions when they began to take effect (see Isa. xlv. 7). To others, however, Jehovah's moral purity seemed to suffer from this conception, and the conception of Satan gradually developed from that of an 'adversary' into that of the *tempter* of mankind. The change in the conception of the moral world is well seen in the account of the temptation of David to number Israel, as given in 2 Sam. xxiv. 1, where it is said

to have been Jehovah who moved him to do it, and by the Chronicler (3d c. B.C.), who makes it the work of Satan (1 Chron. xxi. 1). It would be very difficult to tell how far the Jewish conception of Satan was influenced by the Persian belief in Ahriman; but the likeness between the Hebrew and Persian evil powers gradually became so great that it was easy to confuse them—the distinction between them, however, being manifest, namely, that Ahriman is physical evil which has also become moral evil, while Satan is moral evil becoming physical evil. This explains the unbounded influence which he had acquired in the physical world before the time of Christ (see DEMONIACS). The growth of this influence is clearly seen in the Apocryphal books, which all contain either Alexandrine or Persian elements. In the Book of Wisdom the evil spirit, there first called *diabolos*, the devil, is identified with the serpent of Genesis. He now resides in a subterranean hell, and heads an army of evil spirits, many of whom are undoubtedly Persian—*e.g.*, Asmodeus (Tobit), Pers. *Aehsma-dæva*. Others are mentioned in the Book of Enoch, which contains also the earliest form of the belief about the fall of the evil angels from heaven. The likeness to Ahriman begins distinctly in this, that the D. now adds hatred to God to his hatred of man, and although he does not make war directly on God, seeks to spoil his creation by waging war on man.

An extraordinary development of the doctrine finds expression in the New Testament. The D. has now taken his position as the author of all evil. The solution of the problem regarding the origin of evil is given in 1 John iii.: it comes from the D. His nature is the negation of all that is real and true in God, of light, of love, and of life. But being now cast out from heaven and all communion with it, he can no longer influence God against men; he therefore vents his rage directly on men themselves. He is especially the antagonist of Christ and of Christians; and necessarily so, since the mission of the Messiah (q. v.) was by a victorious struggle with Antichrist (q. v.)—the 'Prince of the demons,' the 'Ruler of the power of the air,' the 'Ruler of this world'—to establish the 'kingdom of heaven.'

In the early Christian centuries many influences combined to foster this notion of an antagonistic parallelism between the kingdom of light and the kingdom of darkness, and to establish more definitely the conception of a kingdom of the D. opposed to the kingdom of God; the persecuted Church representing the latter, the persecuting world the former. Hence expulsion from the Church was 'giving over to Satan,' and every new convert to Christianity, before being baptized, was exorcised, or had the D. driven out of him (see EXORCISM), and was required to abjure the D. and all his works. The notions about this opposition were most fully developed in the theory of redemption, which, as taught by Irenæus, was as follows:—Man having by the fall become the D.'s rightful property, it would have been unjust on the part of God to deprive him by violence of his own. Accordingly the D. was able to stipulate that, if he gave up his claims on man, Christ should be handed over to him. But in this transaction he was outwitted, for when he got Christ he found that he could not keep him. Having swallowed the 'bait' of his human nature, he was so tortured by the 'hook' of his divinity that he was glad to let him go.

During the following centuries, and on through the Middle Ages, the doctrine of the fall of Satan and the evil angels was fully developed. To account for the fall of man, the fall of the angels had to happen before that event. According to Augustine, they were created on the first day of Genesis i., when God said 'Let there be light,' and fell on the second, when He divided the waters under the firmament from the waters above the firmament. The details of their fall were filled in from texts of Scripture. Thus the fall of the arch-fiend was due to pride and envy. According to St Bernard's exposition of Isaiah xiv. 12, 13, he was cast out of heaven because, although entitled as a seraph to stand above the throne of God (Isa. vi. 2), he presumed to *sit* in the presence of the Eternal. The other angels fell through lust (Gen. vi. 4). To the D. was now (before the 9th c.) given a body of an endless variety of form and feature, borrowed from the different pagan mythologies—fiery eyes, red protruding tongue, large horns, a long tail, the hoof of a horse (of the centaurs), or the cloven hoof of the satyrs, &c. He and his imps made a prey of men at large. Now too arose the notion that a compact could be made with the D., by which the soul could be exchanged for the object of one's greatest desire. This led, in the 13th c., to the execution of witches and sorcerers, the supposed servants and accomplices of the D. (See WITCHCRAFT.) It may here be noticed that the name Lucifer (Lat. 'light-bringer') was given to the D. from a mistaken interpretation of the apostrophe in Isaiah xiv. 12, 'How art thou fallen from heaven, O Lucifer, son of the morning.'

The vulgar conception of the D. in modern times has been materially affected by the writings of two men—Milton and Goethe. Milton, by his *Paradise Lost*, familiarised his countrymen with the theological traditions of Italian literature and art, from which the whole scheme of his drama was borrowed; but it had the effect, in the mind even of those who could not look beneath the surface, of divesting the D. of his flesh and blood, horn and hoof nature, whilst in reality the poet idealised Satan altogether, and the hero of his drama was Evil in the abstract. The design of Goethe, in his *Faust*, was very similar. Mephistopheles was simply 'our own ignorant, besotted, dogmatising, superstitious, animal nature, cultivated and developed at the expense of the intellectual in us.' The poet's aim was to show that this is the real nature of the Evil Spirit to which was given so materialistic a form in the middle ages, that this is the real 'Ruler of the world' of apostolic times.

Recent writers on the D. speak of him as a *fallen majesty*, because even 'those who profess belief in his existence live absolutely as if they held no such belief;' and how great is the contrast between the belief of the present day and that of the middle ages may be seen by a study of witchcraft. Those who now refuse to believe in the existence of such a being hold, nevertheless, that there is embodied in the conception of a personal D. a great truth—that no action, in respect of morality, stands purely on its own merits, but involves a principle which extends through all time and all space; the principle, namely, that by any sinful action, or by resisting evil on any particular occasion, we take the side of, or we resist evil in the abstract, or *all* evil, past, present, and to come. The belief in the existence of the D. may be said, at present, to be on its trial. There is, beyond all question, a profound and widespread *suspicion* of the unreality of a personal Agent in the mind of Christendom; but so many grave issues seem to depend on the acceptance or rejection of the doctrine, that men will probably remain undecided in their convictions till they clearly see what the surrender of the belief really implies. If anything be imperilled which sustains and strengthens the religious life, men will prefer to acknowledge a forbidding mystery rather than allow their sense of the dire nature of evil to be permanently weakened. See Roskoff's *Geschichte des Teufels* (Leips. 1870), Buckle's *History of Civilisation*, and Kuenen's *Godsdienst van Israel* (Haarl. 1869; Eng. transl. 1875).

Devil's Bit. See SCABIOSA.

Devise' is an English law-term signifying properly a gift of real estate by a last will and testament; a form of conveyance, *mortis causa*, which the English law admits. The giver is called the *devisor*, and he to whom the estate is given is called the *devisee*. But the term is now applied to all legacies. The power of D. extends not only to property possessed by the testator at the time of making his will, but to all that he may acquire subsequently. When a resident of one county holds real property in another, *lex rei sitæ* prevails. See WILL, DOMICILE.

Devi'zes, a town in the centre of Wiltshire, near the Avon and Kennet Canal, 22 miles N.N.W. of Salisbury. It has silk-throwing mills, and snuff and malt manufactures. Its corn-market is the largest in the W. of England. It returns one member to Parliament. Pop. (1871) 6839. D. took its rise from a castle built here in the reign of Henry I. by Roger Bishop of Salisbury. The name is a corruption of the Latin *Divisæ*, so called from being the point on the road from London to Bath where the Roman and Celtic districts *divided*.

Devonian System (Ger. *Obere Grauwacke*), the name given by Sedgwick and Murchison to the rocks developed in the S. of England and the Rhine lands near Coblenz, which occupy a geological position above the Silurian and below the Carboniferous formations. The Old Red Sandstone (q. v.) of Wales, Scotland, Russia is similarly situated; but in how far these two series, differing considerably from each other both as regards their lithological and fossil character, are strictly contemporaneous it is impossible to say, since in no place do they touch. There seems to have been a physical barrier stretching across England and the

N. of Central Europe S.E. towards the Black Sea, on the S. side of which salt-water deposits of the D. type were formed, and on the N. large lagoons or inland sheets of water, giving rise to the Old Red Sandstone. The D. S. is divided into—(1) *The Lynton Beds*, or Lower D., a series of hard unfossiliferous sandstones resting on chlorite slates, which contain traces of animal life in the form of corals and gasteropods; (2) *The Ilfracombe Beds*, or Middle D., grey schists and limestone, the latter containing a very typical brachiopod, the *Stringocephalus Burtini*, besides numerous corals, crinoids, and gasteropods quite distinct from the Silurian and Carboniferous forms; (3) *The Barnstaple and Marwood Beds*, or Upper D., consisting of sandstones and shales, which abound in marine fossils, a number being identical with those of the Carboniferous system. In the district of the Rhine, Harz, and Thiolinger-Wald, these three subdivisions are also recognised. In N. America the rocks seem intermediate in character between the true D. and the Old Red Sandstone. Fossils corresponding to the types of both formations are obtained, and the upper strata show the same carboniferous character as in England. Land plants are numerous in the N.E., and coal seams, the oldest known in the world, occur here.

Dev'onport, a borough and naval arsenal in Devonshire, England, on the Hamoaze, the estuary of the Tamar, 2 miles W.N.W. of Plymouth, and 248 miles W.S.W. of London. It was named *Plymouth Dock* until 1824. The town stands on a height, and is defended on the N., E., and S. sides by a wall 12 feet high, and a fosse cut in the solid rock to a depth of from 12 to 20 feet, while the sea-entrance is protected by forts with heavy batteries. The houses are generally well built, and the streets regular, with marble footpaths. Water is supplied from Dartmoor. The importance of D. springs from its dockyard and arsenal, which contain everything necessary for building and equipping ships of war. The docks cover an area of 100 acres. A basin and two of the docks were begun in the reign of William III., and two other docks in the reign of George III. The north basin, finished in 1868, is 900 feet long by 400 wide. The port-admiral and governor have official residences in D., and there are extensive barracks and military hospitals. Pop. of parliamentary borough (1871), 64,034, almost wholly dependent on the royal arsenal. Besides ropemaking, sailmaking, and anchor-forging, there are breweries, soapworks, and a large trade in victualling ships. D. returns two members to Parliament.

Dev'onshire (the Roman *Damnonia*, a Latinised form of the Celtic *Dyfnaint*, 'the deep valleys'), a county in the S.W. of England, bounded N. by the Bristol Channel, S. by the English Channel, W. by Cornwall, and E. by Dorset and Somerset. Area, 2586 sq. miles; pop. (1871) 601,374. It has a rocky precipitous coast-line of 160 miles, in the N. indented by Barnstaple or Bideford Bay, in the S. by Plymouth Sound, Bigbury Bay, Start Bay, Tor Bay, Exmouth and Lyme Bay. The county is in great part hilly, and famous for its beautiful streams and valleys. The small *coombes* on its N. coast are not surpassed in picturesque daintiness by any coast scenery in Britain. The centre and S.W. is occupied by Dartmoor (q. v.), and in the E. are Exmoor and Blackdown, also tracts of elevated heath. The rivers flowing N. are the Taw and Torridge; those entering the English Channel are the Exe, Teign, Dart, Tamar, and Tavy. The Dart is specially notable for its wild beauty and its legendary renown. Along the S. coast the climate is extremely mild, in winter attracting many invalids. The famed vale of Exeter includes over 120,000 acres of the finest land in England. In 1875 the number of acres of corn crops was 291,925; of green crops, 156,938; of clover, sanfoin, and grasses, 180,580; and of permanent pasture, exclusive of heath or mountain land, 426,434. In the same year there were 50,700 horses, 218,153 cattle, 976,158 sheep, and 84,898 pigs. The chief exports are live stock, the famous cider, and dairy produce, especially butter and clotted cream. There are manufactures of druggets, serges, linen, carpets, leather, &c., and also valuable pilchard, mackerel, dory, and salmon fisheries. The formation of D. is for the most part Devonian, interposed with igneous rocks, but in the N.E. it is Carboniferous. The tin-mines are among the most celebrated in the world; the other minerals are copper, lead, iron, silver, gypsum, Bovey coal, marble, and porcelain clay. Exeter is the capital, and the other chief towns are Plymouth, Devonport, Tavistock, Tiverton, and Barnstaple. The county returns six members to Parliament. D. was the seat of an early civilisation, through its intercourse with Phœnician or Carthaginian merchants. At Plymouth and elsewhere large collections of bronze weapons and ornaments have been found, showing these to have been gathering-places of pre-Roman-traders. The Tamar is the old border river of the W. Saxons and Britons, and overhanging it is Hingston Down, the *Hengestesdun* of the Chronicle, where Ecgberht defeated a united British and Danish force in 835. The sloping bank of the river is dotted with barrows of unknown antiquity.

Devonshire, Dukes of. The House of D. takes its rise in the 12th c. in the Counts or Earls of Devon. In 1556 the earldom reverted to the Cavendish family (see CAVENDISH), the third of whom was created Duke of D. in 1694. The House of D. has never taken a very prominent part in English politics, but has been distinguished for its firm adherence to the Whig party. The most notable members of the family are **William Cavendish, First Duke of D.**, born 25th January 1640, served in the navy, opposed James II. in Parliament, was a witness in favour of Lord Russell, became Earl of D. in 1684, and in 1694 Duke of D. He was one of the regency during William III.'s absence, and died August 18, 1707.—**Georgiana Spencer, Duchess of D.**, youngest daughter of John, Earl Spencer. Born 9th June 1757, she married William Cavendish, Duke of D., in 1774. Her beauty, wit, audacity, and accomplishments made her one of the most celebrated women of her day. The Duchess was an ardent Whig, and the firm friend of Fox. She wrote *Memorandums of the Face of the Country in Switzerland* (1799), and a poem, *The Passage of St Gothard* (1803), not undistinguished by elegance and fancy. She died March 30, 1806.—**William Spencer Cavendish, Sixth Duke of D.**, son of William Cavendish and Georgiana Spencer, was born May 21, 1790. He was a strong advocate of Catholic emancipation, was Lord Chamberlain in the Grey Ministry, and supported Reform. He took great interest in art as well as in politics, and his art collections were among the finest in England. He died unmarried, 18th January 1858, and was succeeded by his cousin, **William Cavendish, Seventh Duke of D.**, born 27th April 1808, a moderate and enlightened politician. He took part in the foundation of London University, of which he was Chancellor from 1836 to 1856, and succeeded Prince Albert as Chancellor of the University of Cambridge in 1862. His son, the Marquis of Hartington (q. v.), is at present (1876) leader of the Liberal party in the House of Commons.

Dew is the deposition of moisture from the air, which has been cooled below the minimum temperature at which it can retain in suspension the quantity of vapour present. This critical temperature is called the *dew-point*; and it is the temperature at which the deposition *begins* to take place if the air be subjected to a continual cooling process. During the day the heat of the sun evaporates the moisture of the earth's surface, and saturates the air with vapour; but towards and at sunset this action is arrested, the surface radiating the heat it formerly absorbed, and cooling if unchecked below the dew-point, whereupon the D. is deposited. Such is the theory established by Dr Wells, and generally accepted now. Clouds, by obstructing radiation, check this deposition; and winds, by constantly renewing the air in contact with a given surface of ground, have the same effect, since sufficient time is not permitted for the required cooling to take place. D. falls chiefly on calm, serene nights, and earliest upon the objects which radiate fastest. When the temperature is at or below 0° C., the D. takes the form of hoarfrost, the vapour passing at once into the solid state. The D. falling in England annually has been estimated by Dalton as equal to a bed of water five inches deep.

Dew'as, a town of Malwa, Central India, on an affluent of the Chumbul, and capital of a petty state of the same name, taken under British protection December 18, 1818. It is governed by two chiefs, descended from two brothers of a Mahratta family, who possess equal authority, and have each the right of adoption. Area of district, 256 sq. miles; pop. 25,000; revenue, about £42,500.

Dew'berry (*Rubus cæsius*), a Rosaceous plant allied to the Bramble (q. v.), which belongs to the same genus, common in many parts of Europe and Asia. *R. procumbens* and *Canadensis* are the D. of N. America. Both produce an edible fruit, that of the American species being much superior. A kind of 'wine' is made from the juice of the British D. See RUBUS.

De Wett'e, Wilhelm Martin Leberecht, a famous German theologian, was born at Ulla, near Weimar, 14th January 1780, studied at Jena, and was appointed Professor of Theology at Heidelberg in 1809. Called to Berlin in 1810, he was Professor of Theology there till 1819, when he lost his chair for meddling with politics, but was soon after appointed Professor of Theology at Basel, where he remained till his death, 16th June 1849. D., following out the principles of Jacobi (q. v.), laboured, like Schleiermacher (q. v.), to introduce a more pious mode of contemplating the mysteries of Christianity, in opposition to the merely intellectual mode of Rationalism. Hence he was regarded by Rationalists as a mystic, although those who know only his free criticism of the sacred canon and mythological treatment of the Old Testament class him with the Rationalists themselves. In reality he advocated, though in a conditional and philosophical manner, old Lutheran orthodoxy. Among his best-known works are his *Beiträge zur Einleitung in das Alte Testament* (Halle, 2 vols. 1806–7); *Commentar über die Psalmen* (Heid. 1811); *Lehrbuch der Historisch-Kritischen Einleitung in die Bibel Alten und Neuen Testaments* (Berl. 2 vols. 1817–26); *Lehrbuch der Christlichen Dogmatik* (Berl. 2 vols. 1813–16); *Das Wesen des Christlichen Glaubens* (Basel, 1846).

De Witt, Jan, a great Dutch statesman, was born at Dort in 1625. His father, Jakob De Witt, was a strong opponent of William II., Prince of Orange, and the hatred descended to the son, who, after receiving a careful education, entered public life, and was sent by the States of Holland to Zealand, to persuade that province against an Orange policy. De W. further showed ability of another sort by publishing a mathematical treatise titled *Elementa Linearum Curvarum*. At this time he was chosen Pensionary of Holland, and in this capacity he did his best to deprive the House of Orange of power, and even to abolish the office of Stadtholder. He so far succeeded that in 1654, at the end of the war with England, an article was secretly inserted in the treaty with Cromwell, in virtue of which the House of Orange was deprived of all state offices. Subsequently, however, the influence of De W. declined, particularly after Holland was invaded by the French (1672), and the Orange party carried the elevation of William III. to the office of commander of the Dutch forces. In the first campaign the troops were beaten, and the popular hatred against De W. rose so high that he and his brother Cornelius, who had been accused of conspiring against the Prince of Orange, were attacked and murdered by a mob, at the Hague, August 20, 1672. The *Memoirs of De W.*, published in 1667, contain valuable information about the political history of the time.—**Cornelius De W.**, brother of Jan De W., was born at Dort, June 23, 1623. When young he served in the navy, and on the fall of the Orange party in 1650, was made burgomaster of Dort, and deputy for W. Friesland and Holland. He was an able coadjutor to Jan De W., and showed great political talents. He distinguished himself in a sea-fight under De Ruyter in 1672, but was shortly afterwards murdered along with his brother.

Dews'bury, a town in the W. Riding of Yorkshire, on the left bank of the Calder, 30 miles S.W. of York, and 186 miles N.N.W. of London by railway. It is noted for its manufactures of blankets, woollen cloths, carpets, shoddy, &c. In the vicinity are collieries and ironworks. Pop. of municipal borough (1871), 24,764; of parliamentary borough, constituted in 1867, and including Batley and Soothill, 54,940. D. returns one member to Parliament.

Dextrine. See BRITISH GUM.

Dey' (perhaps from Turkish *dai*, 'an uncle by the mother's side'), the former title of the chief of Algiers, corresponding to the Bey of Tunis and Tripoli. The D. was first appointed by the Algerians about 1600. The office became independent of the Sultan about 1623, and was abolished at the French conquest of Algiers in 1830.

Deyster, Louis de, a Flemish painter, born at Bruges in 1656. He studied under Jean Maas, resided for six years in Rome, and also for some time in Venice, after which he returned to his native place. Of a deeply religious disposition, he rarely went into society, and somewhat of the gloom of his life is reflected in his works. Of these, the principal are 'The Death of the Virgin,' 'The Resurrection of Christ,' 'The Appearance of Christ to the Three Marys,' and the 'History of Judith,' in several parts. His manner is bold and large, evincing a strong Italian taste, while his colour is bright, warm, and pure. To give prominent effect to the work, on the chief parts of his subject he occasionally slurs and sacrifices the setting. In later life D. abandoned his art for music. He died at Bruges in 1711. His daughter, **Anne D.** (died 1746), won considerable reputation both in music and painting. She wrote a Life of her father. See Deschamps, *Vies des Peintres Flamands*, vol. iii.

Dhalac', an island in the Red Sea, 9 miles from the coast of Dankali, Abyssinia, of very irregular form, and about 120 miles in circumference. It is of coral formation, and is mostly sandy, with a few grassy spots in the rainy season, affording pasture to asses, goats, sheep, and antelopes. Dubellu, the principal village, imports millet and dates from the opposite coast of Arabia, and exports pearls, sharks' fins, and turtles. D. having no springs, rain-water is preserved in tanks and cisterns. The surrounding islets form the D. Archipelago.

Dha'mi, one of the twenty-six Cis-Sutlej hill-states of India. Area, 40 sq. miles; pop. 5500. It has an elevation of 4000 feet above the level of the sea. In feudal subordination to the government of the Punjab, it pays 360 Rs. of its annual revenue of 8000 Rs. as a tribute.

Dhar, a town in the Bhopawar Agency, Central India, nearly 2000 feet above the level of the sea, is surrounded by a mud wall, while the fort is defended by walls 30 feet high. Pop. formerly estimated at 100,000. D. is now greatly decayed.—The *state* of the same name, of which D. is the capital, and in which opium is largely cultivated, has an area of 2091 sq. miles, and a pop. of 125,000.

Dhar'war, a town in the S. of the province of Bombay, capital of a district of the same name noted for its cotton growing. It has government schools for Mahrattas and Canarese. Pop. (1871) 35,000.—The *district* of D. has an area of 4517 sq. miles, and a pop. of 864,188. Canarese is the prevalent language.

D'Herbelot, Barthélemy, a great French Orientalist, was born of good family at Paris, December 4, 1625. After studying Eastern tongues, and travelling to Italy, Louis XIV. gave him a pension and Professorship of Syriac in the Collége de France in 1692. D. died at Paris, December 8, 1695. His great work, *Bibliothèque Orientale, ou Dictionnaire Universel contenant tout ce qui fait connaître les Peuples de l'Orient* (Par. 1697), written originally in Arabic, is a treasury of learning relating to the literature, history, religion, &c., of the Arabs, Turks, and Persians, still unsurpassed in Oriental scholarship. D. also wrote *Anthologie Orientale* and *Dictionnaire Arabe-Persien-Turc*. Editions of the *Bibliothèque* were published at Paris in 1697, and at Maestricht in 1776. A supplement was added in 1781, containing the *History of Tartary* by Vixtelon, and a translation by Galland of remarkable Oriental sayings.

Dhole, or **Khol'sun** (*Cuon Dukhuensis*), a species of wild dog inhabiting the western frontiers of British India. In size it averages an ordinary retriever, and exhibits a rich brown or bay colour, darkest on the feet, muzzle, and tail. In habits the D. is shy, although when hunting in packs it may evince courage. The ears are pointed and erect. The term D. is also applied to nearly allied varieties of dogs common in Ceylon and elsewhere, and often known by the name of Red Dogs. The genus *Chryseus* includes the latter varieties.

Dhol'ka, a town in the district of Ahmedabad, province of Bombay, British India, 22 miles S.W. of Ahmedabad, surrounded by a mud wall. Pop. (1872) 20,854.

Dholpore', a capital of a Jât state of the same name, Rajputana, 34 miles S.S.W. of Agra. Pop. 9000.—The *state* is separated from Sindia by the Chumbul, and was increased by a grant of territory in 1805. Area, 1626 sq. miles; pop. 500,000.

Dhubbui', a semi-ruined town of India, in the protected state of Baroda, on a tributary of the Nerbudda, 7 miles S.E. of Baroda. It is surrounded by colonnaded walls, affording extensive views of the fine alluvial country, and has richly-sculptured temples, and an immense tank, approached by splendid flights of stairs. Monkeys swarm in the deserted buildings. Pop. 500.

Dhun'che, or **Dhan'chi** (*Sesbania aculeata*), an annual plant of the natural order *Leguminosæ*, a native of India, where it is cultivated for the sake of its fibre, which, as it bears frequent wetting, is valuable for nets, &c., though, from its contracting too much when drying, it is unfitted for ropes, ships' cordage, and such uses. It is also found in the W. Indies and tropical Africa. It is prepared in much the same way as Sunn (q. v.).

Dhwalagi'ri, or **Dhawalagi'ri** ('the White Mountain'), one of the loftiest peaks of the Himalayas, is situated in Nepaul, and has a height of 26,860 feet.

Diabe'tes (Gr. *diabetes*, 'a flowing through,' from *dia*, 'through,' *bainein*, 'to go') is a disease in which there is an increased flow of urine accompanied by much thirst. Two kinds are described by medical writers, *D. Mellitus* and *D. Insipidus*. The former is a disease of which we know neither the origin nor pathology, and consequently its treatment is not satisfactory. It is characterised by increased flow of urine, containing sugar allied to Grape-Sugar (q. v.), and always of a high specific gravity. The patient complains of great thirst, hot dry skin, constipation, and general debility. He gradually becomes emaciated, with a sweet breath, a great tendency to disease of the lungs, and generally a voracious appetite. Sugar is found in the blood, and in most of the secretions and excretions of the body. *D. Mellitus* probably depends on disordered functions of the liver, possibly due to irritation of the nervous system. The treatment consists in abstaining from sugary and starchy food as far as possible, and living chiefly on animal food. Milk has been highly recommended. Of medicines, opium, iron, and quinine are the best. Turkish baths are sometimes beneficial, but in point of fact *D. Mellitus* is seldom if ever cured. *D. Insipidus* is a different disease; the chief symptoms are great thirst, and an enormous increase of urine, of a light specific gravity, but containing no sugar. Steel-drops may be taken with advantage.

Diab'lerets, a mountain in the Bernese Alps, has a height of 10,672 feet, and is chiefly notable on account of two enormous and destructive landslips (hence its significant name), which took place on its sides in 1714 and 1749 respectively. It is composed of limestone, and the huge masses were undermined by the percolation of glacier-water.

Dia'chylon, lead plaster, made by boiling together litharge (oxide of lead), olive oil, and water. D. mixed with resin and soap, and spread on cloth, forms the common or sticking plaster. The name was applied by the Greeks to an emollient plaster composed of the juices of herbs.

Di'adem (Gr. *diadēma*, from *dia*, 'across,' and *deō*, 'I bind'), originally the blue and white band, or fillet, worn by Asiatic monarchs round the *tiara*, fastened behind, the ends being allowed to fall loosely over the shoulders. Sometimes it was broad and adorned with costly jewels, as in the case of the Persian kings; sometimes narrow and plain, or plaited, as in that of Bacchus, who is generally represented in ancient sculptures with this ornament, and is mentioned by Pliny as its inventor. The diadems of the Egyptian divinities had the figure of a serpent upon them. Alexander the Great adopted the D. from the Persians, and Antony, during his amour with Cleopatra, assumed the Egyptian badge. Gradually it became the recognised emblem of sovereignty among the Western nations, and was assigned by sculptors to various divinities. None of the Roman emperors wore it till the time of Diocletian. By the addition of gold and gems it went on increasing in size till it became the modern Crown (q. v.).

Diæ'resis (Gr. *diairesis*, 'a dividing'), a term used in grammar to denote the resolution of a diphthong or of a contracted syllable into two syllables, as Lat. *aulæ*, *aulaï*, *silvæ*, *siliiæ*. The term D. is also applied to the mark ¨ placed over one of the vowels to indicate that it is to be pronounced separately from the preceding or succeeding one, as the case may be.

Diagno'sis (Gr. from *dia*, 'thoroughly,' and *gignoskein*, 'to know') means, in medicine, that knowledge of a disease which the physician can obtain by careful examination of the patient. To make a perfect D. the family and the personal history of the patient must be considered, the condition and functions of the organs of the body and the abnormal symptoms present carefully noted.

Diag'onal is a line joining any two non-adjacent angles of a rectilinear figure. The number of straight lines which can be drawn connecting n points, two and two together, is (see PERMUTATIONS AND COMBINATIONS) $\frac{n(n-1)}{1.2}$. Now, if those points be taken as the angles of a rectilinear figure, n of these straight lines are the *sides* of the figure, and therefore $\frac{n(n-1)}{1.2} - n$ or $\frac{n(n-3)}{1.2}$ is the number of diagonals. Thus a pentagon has 5, an octagon 20, and a nonagon 27. The D. of a solid is a line joining any two non-adjacent solid angles: a cube has 4.

Diagonal Scale, a form of scale used for the accurate and convenient measurement of small subdivisions of any given unit of length. If we suppose, as an illustration, the unit to be one inch and the required subdivision to be into one-hundredth parts, it is easily seen that although it would be possible to divide a straight line, measuring an inch in length, into one hundred equal parts, and then to make measurements upon a scale so constructed, the smallness of the intervals would make both the operation difficult and the measurement inconvenient. By means of a D. S. this could be done easily and without having to set out any smaller dimension than $\frac{1}{10}$th of an inch. The process is as follows:—Draw eleven parallel lines at any convenient distance (say $\frac{1}{8}$th of an inch) apart, calling them O., I., II., III., . . . X., beginning at the bottom. Crossing all these at right angles, draw two parallel lines exactly one inch apart, and divide this inch upon lines O. and X. into tenths. Let the line marking the left-hand end of the measured inch intersect O. and X. in o, and number the tenths 1, 2, 3, &c., towards the right. Then draw lines joining o on O. with 1 on X., 1 on O. with 2 on X., and so on, and the D. S. is complete. The lines OX. and O1 intersect in the point o upon O., and are $\frac{1}{10}$ of an inch apart upon X; at each intermediate line I., II., III, &c, they are therefore 1, 2, 3, &c., *tenths of one-tenth*, that is, hundredths, of an inch apart, and similarly with the lines 12, 23, &c. Thus any required dimensions in hundredths of an inch can be measured upon one or other of the intermediate lines; for example, forty-nine hundredths is the distance from the line OX. to the line 45 measured upon the parallel IX. and so on.

Diag'oras, a Greek poet and philosopher, son of Telecleides, was a native of Melos, one of the Cyclades. He is said to have been a disciple of Democritus of Abdera; and from his open avowal of disbelief in the popular theology he was branded as an atheist. Besides this, very little regarding his career is known for certain. He had, however, taken up his abode in Athens as early as 424 B.C., for Aristophanes, in his comedy of the *Clouds*, which was performed in that year, refers to him as a celebrity. From the epithet *Melian*, applied to Socrates in the passage, it has been conjectured that the latter was a pupil, or, at all events, an acquaintance of D. In 411 B.C. D., having got involved in a lawsuit about impiety, found it expedient to flee from the city. Though a price was set upon his head, he managed to reach Pallene, from which, after a time, he went to Corinth, where he died. While irreligion was the ostensible ground of accusation, the real corner-stone of his offending was doubtless of a political nature. All accounts represent D. as a man of exemplary conduct, stainless morals, and signal earnestness of purpose. Among his philosophical works was one entitled *Phrygioi Logoi*, in which he explained and defended his opinions. D. seems also to have had some reputation as an orator.

Di'al (Low Lat. *dialis*, from *dies*, 'a day, a space of time'), or **Sun-Dial**, an instrument of great antiquity for measuring time. Since the invention and introduction of clocks and watches, it has become of less and less use, till now it is regarded as a mere astronomical toy. Herodotus says the Chaldeans taught its use to the Greeks; and Anaximander gets the credit of having made a D. in 550 B.C. L. Papirius Cursor placed the first one seen at Rome on the temple of Quirinus, and divided the day into twenty-four hours (293 B.C.).

A D. usually consists of a plane surface, in the centre of which is fixed the *style*, whose shadow cast by the sun upon the plate indicates the time by its position. From the same centre are drawn the lines which represent the hours, and it is the laying down of these lines which constitutes the great difficulty attending the making of a D. That edge of the style whose shadow

gives the time must point towards the pole of the heavens—or, more correctly, must be parallel to the axis of the earth. It is apparent, then, that at any given time the sun, the edge of the style, and the shadow will be in the same plane, which plane, passing through the centre of the earth, rotates uniformly with the sun, taking twenty-four hours to complete one revolution. The problem is then reduced to finding the lines of intersection on a given plane of twenty-four other planes, which all pass through the same line given in position, and which make with each other the same angle of 15°. These lines of intersection will not in general make the same angles with each other; a fact which may be easily shown by slicing an orange in a direction not at right angles to the axis, when it will be seen that though each lith is of the same size, the exposed surface of each on the newly-cut circle will not be so. It is not necessary that the D. be horizontal, or even plane, though in the latter case the laying down of the hour-lines is rendered much more difficult, and indeed is best done practically by comparison with a standard D. Next to the common horizontal D., the *vertical* D. is the one most frequently met with. It is usually fixed upon the wall of a church or house, and if possible faces one of the cardinal points If it does not do so, it is termed a *declining vertical* D., and the investigation of its hour-lines becomes much more complicated. The style is usually the straight edge of a thin plate, or a wire; but a slit or hole in a thin plate, allowing the light to pass through, will answer the purpose just as well. The time indicated by the D. is of course the true solar time, and agrees with the mean time, or that shown by a good clock only at four different times of the year, which occur at about the middle of April, the middle of June, the beginning of September, and the end of December. This disagreement with mean or civil time, and the necessity of applying a correction which varies from day to day, are decided objections to the employment of sun-dials as time-indicators. Further disadvantages arise from the impossibility of getting a clearly-defined edge to the shadow cast by the style, and consequently of obtaining even an approximately accurate estimate of time from a D. of convenient size; and also from atmospheric refraction, which has the effect of throwing the shadow a trifle towards noon at all times. Accordingly, a correction must be made, which varies with the sun's altitude, and which must be subtracted for all hours before noon, and added for all hours after noon. On the more elaborately constructed sun-dials tables of corrections for every day in the year were frequently inscribed. For an account of some curious dials, see Brewster's edition of Fergusson's *Lectures;* also Delambre's *Astronomie Ancienne,* and Montusla's *Histoire des Mathématiques.*

Di'alect, in the narrowest sense a local variety of a language, has, since the development of philology and consequent recognition of the connections between various tongues, been applied to languages of kindred origin. Thus Greek, Latin, German are spoken of as Aryan dialects, having sprung from a common Aryan source. In the earlier and more restricted use of the word, the Greek language contained four distinct dialects, the *Doric, Æolic, Ionic,* and *Attic.* The Doric, marked by the broad sound of the *a,* was simple, rough, and unpolished. It prevailed in the Peloponnesus. The Æolic, resembling the Doric in roughness, was peculiar to Bœotia, the adjoining districts, and various Æolian colonies. The Ionic was soft, flowing, melodious, especially rich in combinations of vowels. It was confined to part of Asia Minor and the neighbouring islands. The Attic was at first closely similar to the Ionic, but through the spread of commerce and the influence of the Dorians and Æolians, became a distinct D., more succinct and nervous than the Ionic, more polished and euphonious than the Doric and Æolic. Through the political and literary greatness of Athens the Attic became the Greek D. in which writers of every state wrote. It was at first restricted to Athens and the neighbourhood, but after the Roman conquest was generally, though not universally, adopted throughout Greece. The process of gradual dialectic divergence from a common stock is strikingly shown in the rise of the Romance languages from the Latin. The Latin tongue, even in its palmiest era, embraced two dialects—the polished Latin of the literary and refined classes, and the *sermo plebeius* or *rusticus.* These differed widely in vocabulary and accent; the classic *verberare, equus,* and *pugna,* for example, being represented in the vulgar Latin by *battuere, caballus,* and *battualia,* while *stabulum, oraculum, duplicare, ponere,* &c., are contracted in the plebeian D. to *stab'lum, orac'lum, dup-l'are, pon're,* &c. From this vulgar Latin, which must be distinguished from the *Low Latin,* a corrupt literary medium extinguished during the barbarian invasions, arose the *Romance* or *New Latin* dialects, comprising the French, Provençal, Spanish, and Portuguese, the Rhæto-Romanic of S. Switzerland and the Wallachian. Before the Gothic invasions began to influence the Latin speech, that language was tending to simplify its inflections, and after the barbarians settled in the empire, grammatical disorganisation immensely increased. The Gothic tribes, discarding the inflectional endings, 'seized,' says M. Littré, 'or the solid part of the word, the kernel which offered them resistance;' and thus, for example, the Latin *sollicitare, ministerium, æstimare,* become the French *soulcier, mestier,* and *esmer.* Before the end of the 8th c. the *Lingua Romana Rustica* was the common speech of the Gothic settlers round the Mediterranean, and gradually various dialects became defined, from what had, for a time, been a kind of linguistic debris. These different dialects did not arise from an original variety of speech among the Teutonic tribes, but from historic events subsequent to the general adoption of the *Lingua Rustica.* Thus the Spanish was modified by the Arabic of the Saracen conquest of Spain. Such German words as were preserved amid the *Latina Rustica* assumed a Latin form—the German *banu, alod, marahscalh, siniscalh,* for example, becoming the Romanic *bannum, alodium, mariscallus, siniscallus,* before appearing as the modern French *ban, alleu, maréchal, sénéchal.* Through time the Romance dialects diverged more widely, and each branched into various minor dialects, one of which, generally through some fortuitous circumstance, became at last the classic national speech. The same process is seen in the Teutonic tongues. The Alemannic, Frankish, and Suabian were the dominant German dialects until the High German was rendered the national speech by the influence of Luther's High German translation of the Bible. Similarly Tuscan was rendered the classic D. of Italy because used by Dante for his *Divina Commedia.* For the various dialects of English, see ENGLISH LANGUAGE. The use of the word D. is somewhat vague and perplexing. In one sense every language is a D. in regard to its kindred tongues and the speech whence it mainly sprang, while a local variety of a language, such as Scottish in relation to English, is likewise correctly spoken of as a D. After an indefinite amount of linguistic variation and development, a minor D. may become an independent tongue, as Portuguese, which was at first considered a corrupt D. of Spanish. Scottish is not a different language from English, nor is it in any sense a corrupt form of the latter. It was originally Northumbrian English, and its first peculiarities showed themselves when it was cut off from Southern influence by the union of the English Earldom of Lothian with the old Gaelic kingdom of Scotland and the Cymric principality of Strathclyde. It is now a mere ruin, but it still preserves in its splendid decay many old English forms which have long ceased to adorn the classic tongue of the South. See Gédel's *Littérature Française,* Whitney's *Language and the Study of Language,* Oliphant's *Standard English,* and Skeat's *Bibliographical List of the Works published or in MS. illustrative of various Dialects of English* (Lond. 1876).

Dialec'tic (from the Gr. *dialegomai,* 'I hold conversation with') means a conversation, controversy, dispute; and hence the D. art meant the art of discussing a subject by questioning another. Plato applied the term to the process of metaphysical speculation as well as of logical inference; and this use of it has been revived in recent times; for example, by Hegel. Aristotle limited the term to the logic of probabilities as distinguished from positive demonstration. The word is also employed in its universality as equivalent to logic, the science of the formal laws of thought, and, in a narrower sense, as the application of the laws of reason rather to the discussion or defence of any point than to the attainment of truth.

Di'allage, an hydrated, calcareous augite, varying in colour from pale green to grey and brown. *Bronzite,* so named from its colour, is a nearly allied mineral, being the hydrous representative of the magnesian augites. *D. rock* is a generally palish green or grey rock, granitic or porphyritic in appearance, and composed of labradorite and D.

Di'alogue, a conversation, is especially applied to dramatic conversations, and to writings in which two or more persons are represented discussing any topic. Among the ancients, who were fond of this form of literature, and used it for gay and serious themes, Plato, Cicero, and Lucian (*Dialogues of the Dead*) are memorable. In later times it was adopted in Italy by Petrarca, Machiavelli, Algarotti, Galileo, Gelli, &c.; in France, by Sarrasin, Malebranche, Fénelon, Fontenelle, Diderot, St Mard, and Galiania; in Germany and the Low Countries, by Erasmus, Lessing, Mendelssohn, Engel, Jacobi, Herder, Schelling, Wieland; in England, by Ascham, Spenser, Berkeley, Hurd, Addison, Lyttelton, and others. The chief English work in D.—outside the drama—is Landor's *Imaginary Conversations*, which are of almost peerless beauty of style.

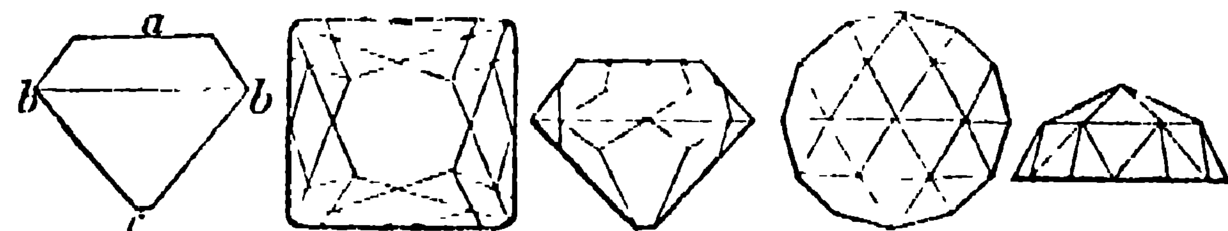
Diamagnet'ic, a term applied by Faraday to those bodies which appear to be repelled by either pole of a magnet. Bismuth and antimony had long been recognised as having such a property, but they were regarded as mere curiosities till Faraday in the course of his experiments showed that matter of almost every kind, solid, liquid, and gaseous, was capable of being repelled or attracted by a magnetic pole. Substances which, like iron and nickel are attracted by a magnet, are called for distinction *paramagnetic*. If a rod of a paramagnetic solid, or an elongated cylinder of thin glass, containing a paramagnetic liquid, be suspended between the poles of a strong magnet, it will either arrange itself *axially*, or in the line joining the poles; and if a D. substance be similarly treated, it will arrange itself *equatorially*, or at right angles to the line joining the poles. A very ingenious method, invented by Plucker, of showing the magnetic nature of a liquid, is to pour a little into a watch glass which rests upon the poles. If the liquid be paramagnetic, its upper surface becomes simply concave; but if D., there are two concavities, one over the termination of each pole. A stream of gas, if directed through between the poles, will continue in its course intersecting the axial line if the gas be paramagnetic, but will be divided so as to pass on both sides of this line if it be D. Another method employed by Faraday to make the effect more apparent was to float a soap-bubble filled with the gas in the magnetic field. This test was found very delicate. These phenomena, at first sight so irreconcilable, are easily explicable upon Faraday's theory of action through a medium, especially when taken in connection with the experimentally established fact that a substance ordinarily D. acts as a paramagnetic body in a medium more D. than itself, and a paramagnetic body acting in a medium more paramagnetic than itself behaves as a D. substance. In other words, these D. bodies behave with respect to the magnetic attraction in the same way as a balloon ascending does to the gravitating attraction of the earth. Taking air as the medium, the more important paramagnetic bodies are: iron, nickel, cobalt, manganese, palladium, platinum, chromium, sealing-wax, plumbago, shell-lac, charcoal, oxygen, &c.; and the D.: bismuth, antimony, gold, copper, silver, zinc, tin, cadmium, mercury, sodium, rock crystal, alum, glass, phosphorus, sulphur, india-rubber, litharge, wood, starch, sugar, beef, apple, blood, water, alcohol, hydrogen, nitrogen, carbonic acid, coal-gas, &c.

Diamanti'no, the name of a river and of two towns in Brazil. The river, supposed to join the Paraguay, rises in the province of Matto Grosso. Eighty miles N.N.W. of Cuyaba it is joined by the Ouro, where the smaller of the two towns named D. stands. The name was given to it from the diamonds found in the neighbourhood. Pop. 4500. The larger town, formerly *Tejuco*, is in the province of Minas Geraes. It lies 5700 feet above the sea, is well built, and has a fine climate. Pop. 12,000.

Diam'eter, in elementary geometry, a straight line passing through the centre of a figure. For central curves and surfaces of the second order, each D. bisects a system of parallel chords. This property has led to a wider definition of the term, applicable to all curves, viz., a D. is the *polar line*, with respect to the curve, of an infinitely distant point. See POLES and POLARS.

Di'amond (Fr. *diamant*, a corruption of the Gr. *adamantinos*, 'unbreakable'), the hardest and most brilliant of all precious stones, and, excepting the ruby, the most precious. It is generally colourless or pale yellow, but is occasionally blue, green, or red. It reflects all the light which falls on it at an angle of incidence greater than 24° 13', and its power of refraction is 2·487, that of common glass being 1·525. To these qualities are due its brilliancy and sparkle. Being the hardest of all known substances, it can only be cut and polished with its own dust. The D. is composed of pure carbon in a peculiar allotropic condition, but the means by which it has assumed that form have not been explained, and all attempts to produce diamonds by artificial means have failed. D. is combustible in oxygen, the combustion producing pure carbonic acid, just as happens in the burning of common charcoal, and under high heat can be changed into a form of graphite or black-lead. Diamonds are at present obtained from three localities—India, Brazil, and Cape Colony. In India they are pretty widely distributed, occurring in the Deccan in the alluvium of rivers, in Bundelkund, and at Sumbulpore on the Mahanuddy. The D. is much scarcer in the East than formerly. In the 17th c. the famous D.-mines are said to have occupied 60,000 persons. A large proportion of the diamonds brought to the market at the present day are found in Matto Grasso, Brazil, where also the D.-yielding soil is widespread. The discovery of rich D. deposits in Griqua Land West, S. Africa, was only made in 1867. From that time till the beginning of 1876 the washings had yielded diamonds to the value of £12,000,000, being at the rate of £2,000,000 yearly. In 1875 there were over 60,000 diggers in the fields, of whom 15,000 were Europeans. The stones found are mostly small and of inferior colour or water. One stone, however, the 'Star of South Africa,' found in 1869, weighed 83½ carats, and was valued at £20,000, and another of 147 carats was unearthed in 1873, while a valuable blue one was found in 1876. The existence of diamonds in Australia has also been demonstrated, and they have been found in Borneo, Sumatra, and Java, and in the Ural Mountains.

The cutting and polishing of diamonds, upon the success of which the beauty of the stones depends, is chiefly performed by



Top and Side View of Double Brilliant. Top and Side View of Rose Diamond.

Jews in Amsterdam, and the industry demands great care and skill. In many cases the rough stones require to be split or cleaved into form before cutting is begun, and for the success of this delicate operation the workman must take advantage of the cleavage lines of the stone. Diamonds are chiefly cut into the form of single or double brilliants. In this form the stone consists of two principal parts—the bezil and the pavilion. The bezil extends from the table *a* to the girdle *b*, and the pavilion from the girdle to the cutlet *c*. The facets which touch the table are called star facets; those which touch the girdle either from above or below are skill facets. In the single-cut brilliant the table is square, and the whole stone presents thirty-eight facets. The other forms of the D. are the table-cut, a form only found in old stones, and the many-sided rose-cut, in which brilliancy is sacrificed to size.

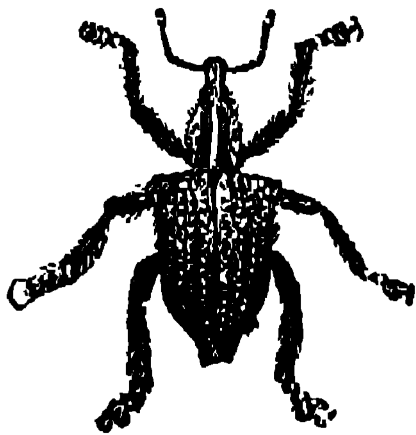
The value of a D. depends on its brilliance, purity of colour, freedom from flaws or specks, and its shape and size. By a D. of the first or second 'water' is meant one comparatively free from clouding and imperfections. A peculiarity, such as a blue, green, or red hue, gives the stone an exceptional, and sometimes an exorbitant, value. Diamonds are subject to great fluctuations in value, and the recent discovery of the Cape deposits have caused a considerable depreciation in price. Up to a weight of 5 carats (20 grains) the value is estimated by the weight, and Mr Harry Emanuel gives a table of the value of perfect brilliants, from which we make the following extracts. It should be stated that the table in question refers to a period previous to the discovery of Cape diamonds. A brilliant weighing half a carat, £5, 10s., three-quarters, £9, 10s., one, £18, one and a half, £38, two, £65, two and a half, £88, three, £125, four, £220, five, £320. Above that weight the price of the stones increases rapidly, and the value becomes a question of individual bargaining.

A few diamonds of uncommon size are known to exist, some of which have a remarkable history. The Koh-i-noor ('mountain of light'), which is now among the British crown jewels, is a D. which has figured in Indian annals from a very remote period, and been the object of much cupidity and intrigue. When it

came into the possession of the Queen, in 1850, it was an irregularly shaped and rather lustreless mass, weighing 186 carats. By subsequent cutting its weight was reduced to 102¼ carats, but it was formed into a brilliant of unequalled purity and sparkle, and its value is now estimated at £1,000,000 sterling. The largest D. is asserted to be the Braganza, a Brazilian stone in the Portuguese crown collection. Its weight is stated at no less than 1880 carats, but the genuineness of the stone is doubted. Next in weight comes the Mattan D. of Borneo, an uncut stone, weighing 367 carats. Of other well-known stones are the Orloff, in the Russian crown collection (194¼ carats); the Regent, or Pitt, among the French crown jewels (136¾ carats); the Emperor of Austria's brilliant (139½ carats); and the Brazilian Star of the South (125 carats). The King of Portugal also owns a Brazilian stone of 138½ carats, and the Emperor of Brazil, the Sultan of Turkey, and the Shah of Persia, are known to possess some valuable stones.

Diamonds have an industrial value for the cutting of glass and the polishing of gems. The stone used in the D. rock-boring machines in use is the carbonado, boart or black D. of Brazil, of no lustre or value as a gem, but possessing the hardness of the precious D. See Dieulafait's *Diamonds and Precious Stones*, &c. (1874), and Emanuel's *Diamonds and Precious Stones*, &c. (1875); and Streeter's *Precious Stones and Gems* (1877).

Diamond Beetle (*Curculio imperialis*) a genus of Coleoptera or Beetles, belonging to the *Tetramera*, and so named from its gorgeous hues and lustres. It is allied to the Weevils (q. v.), and is coloured of a golden green, with two black bands on the thorax. It is found in Brazil and other parts of S. America.


Diamond Beetle.

Diamond Harbour, on the left side of the Hoogly, the port of Calcutta, from which it is distant about 30 miles S.S.W. D. H. is very unhealthy, especially during and immediately after the periodical rains. The adjacent rice-fields yield heavy crops. Since the opening of the railway to Canning Town, on the Nautch river, the trade of D. H. has declined.

Diamond Necklace, a costly ornament which gave rise to one of the strangest episodes in French history. It was made for Madame du Barry by Boehmer, the King's jeweller, was formed of 500 diamonds, and valued at about £80,000. On the death of Louis XV., it could find no purchaser, and the Cardinal de Rohan, a rich libertine, persuaded by a clever adventuress, De Lamotte, that the Queen viewed him with favour, procured it as a gift for Marie Antoinette. On February 1, 1786, Rohan took the ornament to Versailles, and next day, Villette, an accomplice of De Lamotte, carried it off with the words *De par la reine*. Having thus duped Rohan, De Lamotte and her associates fled from Paris, and began to sell the diamonds, but were shortly flung into the Bastille along with Rohan. De Lamotte was branded and imprisoned for life, but the others were acquitted. The affair led to much scandal, and fastened an odium on the Queen among the Parisian populace, which clung to her to the last, and helped to sharpen the people's fury against her. See Carlyle's *D. N.* in his *Miscellaneous Essays*.

Dian'a, a Roman goddess, identified in the confusion of the mythologies with the Greek Artemis, the goddess of hunting, was the daughter of Jupiter and Latona, and twin-sister of Apollo. The place of her birth was Delos (q. v.). As the huntress-queen, she is represented as a full-grown maiden, of masculine figure, with bare limbs and buskined feet, armed with bow and quiver, and attended by hounds. As sister of the Sun-god she is regarded as the Moon-goddess, and represented as wearing a crescent on her forehead. As a benignant goddess invoked by women in travail, she is called *Lucina*, *Ilithyia*, and *Genitalis*; in the cross-roads she was worshipped as *Trivia*, and from her triple character as a celestial, terrestrial, and infernal deity, she received the name *Triformis*. She was the goddess of chastity—her own is not unimpeached, as witness her amours with Endymion, Pan, and Orion—and as such severely punished those who attempted to violate her. At Ephesus she had a splendid temple—one of the seven wonders of the world—in which she was represented as 'the many-breasted,' symbolising the fertility of the earth. At Aricia, according to Strabo, she was ministered to by a priest, one of whose qualifications always was that he had murdered his predecessor. At Sparta she was propitiated by human victims; but goats, kids, boars, and oxen, were her usual offerings. The name D. is the feminine form of *Dianus* or *Janus*, and is akin to the Lat. *Juno*, the Gr. *Zeus*, and the Sansk. *Dyaus*, 'the sky.' The solar origin of the myth is apparent even in its later and poetised form.

Diana Monkey (*Cercopithecus Diana*), a species of Catarhine monkeys, found in Guinea, Congo, and other parts of Africa, and attaining a length of about 4½ feet. It is distinguished by a long white beard, and by a crescentic white line on the forehead. The fur is generally chestnut, the lower parts being bright orange. The hands are black. The D. is intelligent and of cleanly habits.

Dia'no, a town in the province of Salerno, S. Italy, 45 miles S E. of Salerno, near the river Calore. It has a strong castle, and several churches and convents. Pop. about 7000.

Dian'thus. See PINK.

Diapa'son, in music, is a word used in several senses. In ancient writings it was used for the octave; in France at present it means *pitch*, while in this country it sometimes signifies the whole range or compass of a voice or instrument. In the organ some of the principal stops are called *diapasons*; they are of 'eight-feet pitch,' the note corresponding to any key being of the same pitch as in the pianoforte.

Diapason Regulator, an instrument invented by M. Duhamel, and improved by M. Breguet, which is capable of measuring minute intervals of time. It consists essentially of a revolving slowly advancing cylinder, on which a sinuous line is produced by a style fixed laterally to a prong of a diapason or tuning-fork. The time of vibration of the fork being known, the number of sinuosities, impressed while a certain occurrence lasts, gives, by a simple calculation, the time of duration. M. Breguet fixed the apparatus to clockwork, so as to regulate the motion of the cylinder, and lengthen the time during which the fork vibrates.

Diapedo'sis (Gr. 'a leaping through'). Under certain abnormal conditions, both red and colourless corpuscles of the blood may leave the blood-vessels without rupture of their walls. This is D. The red corpuscles sometimes escape during venous congestion, when, in consequence of the high pressure, the plasma is first squeezed out, and afterwards the red corpuscles. The colourless corpuscles leave the vessels by virtue of their power of amœboid movement in inflammation (q. v.). When the web or mesentery of a frog is seen under the microscope in a state of inflammation, the colourless corpuscles may be observed clinging to the walls of the vessels, and actually passing through these into the surrounding tissues. The conditions seem to be sufficient slowness of the blood stream, and a peculiar adhesiveness of the colourless corpuscles, the result of inflammation.

Di'aper (from 'd'Ipres, because manufactured at Ypres in Flanders; Fr. *diapre*, *diaspre*, 'marbled, or variegated;' Ital. *diaspro*, Lat. *diasprus*, 'an ornamental textile stuff;' Lat. and Gr. *iaspis*, 'jasper,' which was much used in ornamenting jewellery) is a variety of linen or other cloth, figured with a pattern, and produced by a process of twilling, in use chiefly for table-linen and towelling. D.-work in architecture, in mural painting, and decorative art generally, is the covering of a flat surface, which might otherwise have a monotonous and bald appearance, with a repeated floral or arabesque pattern. The D. is often used in heraldic painting to relieve and vary fields of black and white, but this arbitrary decoration does not form part of the heraldic bearing.

Diaphan'oscope (Gr. *diaphanos*, 'transparent,' and *skopeō*, 'I see'), a box, with or without a lens, for exhibiting transparent photographs or other pictures. It is frequently combined with a Stereoscope (q. v.).

Diaphoret'ics (Gr. *diaphoretika*, from *diaphorein*, 'to throw off') are medicines which promote insensible perspiration by opening the pores of the skin, or by stimulating the glands which secrete the sweat. Acetate of ammonia, antimonials, Dover's powder, and very specially the new drug *Jaborandi* (q. v.), are examples; and hot baths, as the Turkish bath, may also be regarded

as D. After using them, great caution is necessary for some time to prevent the patient catching cold.

Di'aphragm (Gr. *diaphragma*, 'a partition wall;' in Eng. *midriff*, Old Eng. *midrif*, 'the middle of the *hrif*, or bowels'). This is a partition between the abdominal and thoracic cavities, formed partly of membrane and partly of muscle. The muscular fibres arise from the bodies of several of the upper lumbar vertebræ, from two arches external to these, from the cartilaginous end of the sternum, and from the cartilages of the six lower ribs. They all pass towards the centre, and unite with a strong tendinous membrane, of a trefoil shape, called the central tendon of the D. The D. is perforated by three large holes for the passage respectively of the aorta, the œsophagus, and the vena cava. During relaxation of the D., as after death, it presents an arched form, the convexity of which is directed towards the thorax. By contraction of the muscular fibres the D. centre descends, the convexity becomes less, and consequently the vertical diameter of the thorax is increased, as in inspiration. When the D. relaxes the centre ascends, as in expiration. The D. is present only in mammalia. See RESPIRATION-MECHANISM.

Diaphragm, a perforated plate, employed in optical instruments for cutting off all superfluous light, thus increasing the sharpness and brightness of the image.

Diarbek'r (anc. *Amida*, Arab. *Amid*, Turk, *Kara-Amid*), a fortified town, and the capital of a vilayet of the same name, Asiatic Turkey, lies on the Tigris, 195 miles N.E. of Aleppo. It is the seat of a Nestorian metropolitan, of a Jacobite patriarch, and of a Roman Catholic and an Armenian bishop, and has a great khan, occupied by the garrison, 25 mosques, 9 churches, and many baths and bazaars. The climate is hot and unhealthy in summer, but cold in winter. The Tigris, which is here crossed by a stone bridge, is often frozen over. D. lies in the trading-way between Bagdad and Constantinople. Its manufactures, which have suffered from the introduction of European goods, are chiefly morocco leather, cotton and silk stuffs, copper utensils, and pipe-heads. It was formerly one of the most flourishing trading places in Turkey, but its pop. of 400,000 was decimated by the plague in 1756-57. Pop. (1872) 34,000, of whom 13,000 are Mohammedans and 11,300 Armenians. D. occupies the site of the ancient *Amida*, which became a Roman colony in 230 A.D., and the seat of a Christian bishop in 325. It was fortified by the Emperor Constantine. After being in the hands of various Turcoman dynasties and of the Persians, and being sacked by Timur (1394), it was finally annexed to Turkey by Selim I. in 1515.—The *vilayet* forms the E. portion of Kurdistan, and is watered by the Tigris and Euphrates. It is in part inhabited by nomads. Area, 37,685 sq. miles; pop. (1864) 708,288.

Diarrhœ'a (from Gr. *dia*, 'through,' and *rheō*, 'I flow'), a disease characterised by frequent discharges of liquid fæces from the bowels, commonly called *purging*. It is generally accompanied with pain, nausea, foul tongue, a bad odour in the breath, flatulence, and in many instances fetid stools. It has many causes, as indigestible food, unripe fruit, new vegetables, meat which has commenced to decay, too fat meat, &c., cold, damp, heat—the last called 'summer cholera;' or it may be due to drinking foul water or partaking of some purgative medicine. D. is also a frequent symptom of some other disease, specially Phthisis (q. v.), and typhoid fever and cholera. The treatment depends on the particular cause. When D. is due to some irritating substance in the bowels, a small dose of opening medicine is beneficial to the patient; when due to irritation of the bowels, opium is one of the quickest and most efficacious remedies. Of astringents, gallic acid, chalk, and lime-water are the best. D. is not generally a fatal disease, except in aged and very young persons, or in those affected with consumption and other wasting diseases. It is much more common in hot than in cold climates, in the former of which it often partakes of the dysenteric form. See DYSENTERY.

Diarthro'sis, a term used in anatomy to denote a particular form of joint, such as that of the elbow. Here we have plates of cartilage covering the articular surfaces of the bones. The joint is lined in every part by a membrane, termed a *synovial* membrane, which secretes a fluid which lubricates the joint. The bones are held together by strong fibrous ligaments, constituting membranous capsules, bands, or cords; and they are likewise kept in apposition by the tension of surrounding muscles and by the pressure of the atmosphere. See JOINTS.

Di'ary (Lat. *diarium*, from *dies*, 'a day') at first meant the daily allowance of food to slaves, and afterwards a notebook of daily incidents, which is its present signification. Every one, but especially professional men, will find a minute or two in the morning or evening well bestowed in keeping a short and simple D. Every one must be guided by his own tastes and occupations regarding the matter which he enters in it. The name of the month should either be written each day, or denoted by some mark; because if only written for the first day, on referring to the D. there is trouble in finding out what month the incident took place in. A D. is specially useful in travelling.

Diaschis'ma, the Greek name for a small interval (having a vibration fraction equal to $\frac{2048}{2025}$), which occurs between the true pitches in two keys of a note which, in the tempered scale, is made alike in both. See ENHARMONIC and TEMPERAMENT.

Di'astase is a nitrogenous substance developed during the germination of seeds, and is characterised by the remarkable property of causing starch to be converted first into dextrine, and later into grape-sugar. (See GLUCOSE.) In the process of malting grain is allowed to sprout, and the germination is then checked by heat. The malt thus prepared contains a store of D. more than sufficient to convert the starch contained along with it in the grain into sugar. On *mashing* or boiling the malt with unmalted grain, the starch in both is converted into grape-sugar, which dissolves in the water and forms the *sweet wort* of the brewer. The grape-sugar in the wort is subsequently converted into alcohol during the process of fermentation. The proportion of D. in malt is very minute, seldom exceeding 0.002 to 0.003 per cent.; but the smallness of the quantity is compensated by the extraordinary activity of the D., 1 part of the latter sufficing to convert 2000 parts of starch into grape-sugar. D. has never been prepared in a sufficiently pure state for analysis. In the impure condition it may be obtained by extracting malt with water, maintaining the solution for some time at a temperature of 70° C., filtering from the albuminous principles coagulated by this treatment, and finally precipitating by absolute alcohol. Prepared in this manner D. is a white powder.

Dias'tole is dilatation of the heart and arteries when the blood enters their cavities. It is the opposite to *systole*, when the heart and arteries contract to send forth the blood. See CIRCULATION OF THE BLOOD, HEART.

Diather'manous (Gr. *dia*, 'through,' *thermos*, 'heat'), a property possessed by certain substances, notably by rock-salt, of allowing radiant heat to pass through them in the same way as transparent bodies permit of the passage of light. See HEAT.

Diath'esis (from Gr. *dia*, 'through,' and *thesis*, 'a placing or arranging') is a term used by the older physicians to describe the constitution of an individual rendering the person peculiarly liable to certain diseases. It is transmitted from parent to child. We speak of the gouty D., the cancerous D., tuberculous D., &c.

Diatoma'ceæ, or **Di'atoms**, an order or sub-order of green-spored Algæ, yellow-brown in colour, and containing a large quantity of silex or flint in their fronds. Their mode of reproduction resembles that of the *Desmideæ* (q. v.). In their adult state they are mostly free-moving, but in their young state many of them are attached by a slender pedicle, which in some genera is repeatedly dichotomous. The separate joints, which often remain connected for a long time, are called *frustules*, and are in most cases adorned with beautiful sculpturing, so that even in a fossil condition the species can be easily distinguished. In many, if not in all, cases there are minute openings in the frustules, through which they derive their nourishment from the medium in which they live. They are found both in salt and fresh water, on damp rocks and walls, flower-pots, glass of hot-houses, and often in collections of powdery-looking matter at the bottom of standing pools. The Tripoli limestone beds, of great thickness, are almost built up of extinct species in a fossil condition, hence this rock is well adapted for polishing. In Sweden large quantities are found in a fossil state in the mountains, and under the name of *Berg Mehl* (mountain meal) are mixed with flour as food, though they can have no direct nutritive qualities. The order is found in every part of

the world, and on the Polar Seas in such abundance as to give the green discoloration to those parts which the whalers note as the favourite haunts of the true whale (*Balæna mysticetus*). Dr Hooker also found the Antarctic Ocean stained of a brown colour with them. They form the food of many mollusca; hence in the stomachs of fishes which have fed on these mollusca, and in the guano of birds which have lived on the fishes, numbers of unique forms are frequently found. An immense number of species has been described, and the list is always being increased by new discoveries. But it is doubtful if some of the so-called new species are not immature forms of others already known.

Diaton'ic ('by tones'), a term used in music to describe the arrangement of the notes of the scale upon which all our music is based. The Greek 'D. genus' seems to have been based upon the scale of C major, and not to have included the same relative intervals in any other key, and the fact that a D. scale could be based upon any note of any pitch whatever had to fight its way into full recognition during the first ten centuries of our era. It should be remembered that while the D. scale—with such modifications as those which occur in what we call *minor* scales—is the only one which satisfies *our* ears, and the only one possessing certain mathematical properties, it is only one of a great number of possible scales. The Eastern nations, for instance, use subdivisions of the scale which are as intolerable to our ears as European music is strange to them.

Di'atribe (Gr. *diatribe*, lit. 'a rubbing through'), a name applied originally to a prolonged discussion or critical analysis, now synonymous with a bitter invective or severe criticism.

Diaz, or **Dias, Bartolommeo**, was one of the distinguished Portuguese navigators of the second half of the 15th c., whose feats are sung in Camoens' *Lusiad*. In 1486 he led an expedition fitted out by João II. beyond the point on the Guinea coast which had been reached by Cam and D'Aveiro. With two vessels of only 50 tons burden D. pushed on to Algoa Bay, subsequently named by the British Port Elizabeth. Sailing along the Caffre coast, he entered in lat. 34° 30′ the Great Fish River (called by the Dutch Grote Vis River), but at the Island of Cruz was compelled by the entreaties of his sailors to turn back. He gave the name of Cabo Tormentoso ('Cape of Storms') to what was shortly afterwards known as the Cabo de Buena Esperanza ('Cape of Good Hope'). Returning to Lisbon in December 1487, he accompanied Vasco di Gama on a portion of his famous voyage, for which D. had built the ships *St Raphael* and *St Gabriel*. He perished in a great storm which shattered the fleet of Cabral after its discovery of Brazil in 1500. See Lopez, *Historia da Conquista da India*.—**Miguel D.**, born in Aragon, was a friend and companion of Columbus. Leaving the colony of Isabella, he established himself near the mouth of the river Ozema, in Hayti, from which he introduced his countrymen to large gold-mines. When in 1500 Bobadilla superseded Columbus as governor of the islands, &c., of the New World, D. was Alcalde of San Domingo, and resisted the entrance of the new governor. After a period of disgrace he was made governor of Porto Rico. He died in 1514. See the Histories of Columbus by Lamartine and W. Irving, and Las Casas, *Historia general de las Indias* (2 vols. Par. 1822).

Dib'ble, a simple implement once used in fields, now only in gardens. It is of wood, and is 15 inches long with a cross-head for the handle; the shaft is round and tapering, of about two inches in diameter. Dibbling is too slow for farm practice, although found by experiments in thick sowing to yield better results than drilling. Experiments with oats in dibbling, drilling, and sowing broadcast show that of 360 grains placed in the ground there resulted of dibbled plants 270; of drilled plants, 257; of broadcast, 226. Yet drilling is much more advantageous up to a certain point than dibbling. Of 108 seeds, dibbling ɔ. ' 150 plants, and drilling 163.

Dib'din, Charles, the musician and song-writer, was born at Southampton, 15th March 1745. His musical talent showed itself very early; an opera, *The Shepherd's Artifice*, of which he had written both the words and the music, being produced at Covent Garden Theatre in 1761. D. remained before the public as singer, actor, or theatrical manager until 1805, when he retired in somewhat straitened circumstances. Government, however, granted him a pension of £200 a year until his death, 25th April 1814. D. is best known for his sea-songs, of which he wrote (both words and music) nearly 1200. Coming at a time when the English navy was actively employed, and naval affairs were in everybody's mouth, these spirited songs won unbounded popularity, which not a few of them still retain. A fine edition with drawings by Cruikshank was published in 1861. Besides his sea-songs D. wrote a *History of the English Stage* (5 vols. Lond. 1795), and *Professional Life* (2 vols. Lond. 1802). His two sons, **Charles** (died 1833) and **Thomas** (died 1841) were both theatrical writers of some mark.—**Thomas Frognall D.**, nephew of the writer of sea-songs, was born in 1776 at Calcutta. Having studied at Oxford, he joined the legal profession, but took orders in 1804; from which time till his death, November 18, 1847, his life was devoted to bibliography. D.'s works show wide research and tireless industry, but are marred by lack of exact scholarship and critical discernment. The chief are *Typographical Antiquities of Great Britain* (1810–19), *Bibliographical Decameron* (1817), *Library Companion* (1824), and *Reminiscences of a Literary Life* (1836).

Dibranchia'ta (Gr. 'two-gilled'), the name applied to an order of Cuttlefish (q. v.) distinguished by the possession of two branchiæ or gills, and not more than eight or ten arms; by the arms being provided with suckers; by the presence of an ink-sac, and by the shell being internal, or, if external, not chambered. In this order are the paper nautilus or *Argonaut*, the *Octopi* or *Poulpes*, the Squids, *Spirula*, the extinct *Belemnites*, &c. The companion order, *Tetrabranchiata*, is represented by the pearly nautilus alone.

Dice (plur. of *die*) are small cubes made of ivory or bone, with black dots, ranging in number from one to six, on each of their sides, and much used in games of chance or hazard. They are subject by Act of Parliament to a duty of 20s. a pair. If found in any place suspected of being a 'common gaming-house,' under the Act 33 Hen. VIII. c. 9, they are held as proving the suspicion true, unless the contrary be shown. (See GAMING.) When D. are fairly made, there is no way of shaking the D.-box so as to throw a given number, but professional gamblers sometimes 'load' their dice—*i.e.*, plug them with lead on a particular side—so that the highest number generally turns up.

Dicen'tra, a genus of Fumariaceous plants (the *Diclytra* or *Dielytra* of De Candolle). *D. Cucullaria* is the 'Dutchman's Breeches' of the United States; *D. Canadensis*, the squirrel-corn; *D. farinosa*, a species from Virginia and N. Carolina, much cultivated in our gardens; but the best-known species is *D. spectabilis* of Northern China and Siberia, one of the most beautiful of the genus, introduced into Britain in 1846. It can be grown in the open air, but requires the protection of the house in most situations before it can attain to full perfection. It is one of the favourite plants of the Chinese.


Diclytra spectabilis.

Dichlamyd'eous (Gr. *dis*, 'twice,' and *chlamys*, 'a covering'), a botanical term expressive of a flower having both calyx and corolla. De Candolle divided Dicotyledonous (q. v.) plants into D. (including *Thalamifloræ*, *Calycifloræ*, and *Corollifloræ*) and *Monochlamydeæ*, which formed a subclass by itself.

Dichot'omous (Gr. *dichotomos*, 'cut into two equal parts'), a botanical term signifying having the divisions always in pairs, and equally applicable to branches, veins, the forking of ferns, and the fronds of algæ. The stem of the mistletoe and the branching of the Doom Palm (q. v.) are examples.

Dich'roism (from the Gr. *dis*, 'twofold,' and *chrōs*, 'colour'), a property possessed by certain crystals and minerals, which present different colours when viewed by transmitted light in different directions. Thus mica is nearly opaque in one direction, but transparent and of a different colour in another. Crystals of chloride of palladium are deep red when viewed along, and a bright green when viewed across, the axis.

Dick Bequest, The, is a fund established by James Dick, 'of Finsbury Square, London,' to maintain and assist country parochial schoolmasters in the counties of Aberdeen, Banff, and Moray; not, however, in such a way as to relieve any one from legal obligations to support them, or to diminish such support, but 'in such manner as shall seem most likely to encourage active schoolmasters, and gradually to elevate the literary character of the parochial schoolmasters and schools aforesaid.' Mr Dick, born at Forres, 1743, on his death in 1828, left the bulk of a large fortune, acquired chiefly in the W. Indies, for the above purpose. The bequest amounted finally to £118,787; the annual income remaining to be distributed, after deducting all expenses, is on an average about £4000. To ensure the literary proficiency of the schoolmasters, the trustees instituted an examination in literature and science; and no teacher can participate in the D. B. till he have passed this examination. Again, to ensure the efficiency of the teaching, they attached a certain money value to instruction in the higher branches, and the manner in which these are taught is taken into account, as judged by a 'visitor' or inspector. The proportion paid to a teacher depends on the statistics of his school, the report of the visitor, and the character of his examination. Those who pass with distinction receive permanently a higher grant, and unusual proficiency is further rewarded by a sum of money at the time. The report of the visitor on the school determines whether the teacher shall receive the amount to which his statistics entitle him, less than that amount, or more. The lowest grant is about £18, the highest about £60. Since the passing of the Education (Scotland) Act of 1872, the trustees have resolved to admit only one public school in each parish to the benefit of the D. B., except where there is a population above 2000. They have also attached a higher money value than formerly to instruction in the higher branches. These steps have been taken with the view of counteracting what is believed to be the tendency of the Government Education Code to sacrifice the higher branches to general efficiency in the lower. See *Report on Education* in connection with the D. B., by Simon S. Laurie, 1865.

Dick'ens, Charles, an English novelist, was born at Sandport, near Portsea, Hampshire, February 7, 1812. His father, John D., for some time a clerk in the Navy Pay Office, seems to have been an amiable, though unfortunate and improvident man; his family were sometimes in great straits while he was an inmate of Marshalsea Prison, and in consequence D. had at an early age to shift for himself. The first place he filled was a menial one in a blacking warehouse; from this he went as a clerk to an attorney's office in Chancery Lane, London, where he showed a taste for theatricals; finally, he qualified himself for the post of parliamentary reporter. The first situation he obtained as such was on the *True Sun;* he next proceeded to the *Morning Chronicle,* where his ability and industry won him the admiration and encouragement of the editor, the well-known John Black. In the evening editions of the *Chronicle* D. first showed his powers as a humourist by his essays entitled *Sketches by Boz* (1836). The same year he married Catherine Hogarth, daughter of a fellow-labourer on the *Chronicle.* The *Sketches by Boz* were succeeded by a work which at once raised D. to the first rank among English humourists. This was the *Pickwick Papers,* which has probably evoked more innocent laughter than any other book in the world before or since. Some of the characters, such as the two Wellers and Pickwick himself, are immortal. D. was now recognised as a great artist, and was warmly appreciated by the first critics of the age. His next work was a novel with a more ambitious plot (*Nicholas Nickleby*), which, besides, had a moral 'purpose,' namely, to paint the weaknesses and barbarities of the cheap-school system. It was not less successful, and D. continued to pour forth fiction after fiction, all of which were greedily devoured, and most of which exposed social sores and delineated individual peculiarities. The chief are *The Old Curiosity Shop, Barnaby Rudge, Oliver Twist, David Copperfield* (in the opinion of many his finest work), *Martin Chuzzlewit* (the fruit of a voyage across the Atlantic), *Dombey and Son, Bleak House, Hard Times, A Tale of Two Cities, Little Dorrit, Great Expectations,* and *Our Mutual Friend.* D.'s faculty of humour began to flag towards the end, and his pathos had always a tendency to become maudlin, yet many of his characters, such as Little Nell, Mrs Gamp, Agnes, Micawber, Tom Pinch, Fagin, and Pecksniff, are unique in literature. Probably no novels have had such a healthy and genial moral influence as those of D. His boundless energy required and found other vents. He was a clever actor, and wrote an opera, *The Village Coquettes,* which was acted once in 1836; he travelled much, and there is no livelier account of travel than his *American Notes for General Circulation* (1842). As a writer of Christmas stories he is unrivalled, in proof of which one need only name his *Christmas Carol, Chimes, Cricket on the Hearth,* and *Dr Marigold's Prescriptions;* and as a public reader of his own works, he obtained great and merited popularity. D. even attempted journalism; he took part in starting the *Daily News* in 1845, and was long editor of a popular weekly magazine, *Household Words,* afterwards merged into *All the Year Round,* and now conducted by his son. D. died June 9, 1870, leaving behind him an unfinished novel, *The Mystery of Edwin Drood.* His Life has been written by his most intimate personal friend, the late Mr John Forster (3 vols. Lond. 1872–74).

Dick'son, David, a notable Scottish divine, born in 1583, at Glasgow, was minister of Irvine from 1618 to 1641, when he was elected Professor of Divinity in his native town; helped to draw up the Confession of Faith, and was ejected from the Church for nonconformity in 1662, the year of his death. D.'s works comprise commentaries on Hebrews, Matthew, and the Psalms, *Therapeutica Sacra,* and a *Treatise on the Promises.*

Dickso'nia, a genus of Ferns, mostly arborescent. The silky hairs from the caudex of *D. Culcita* of Madeira and of *D. chrysotricha* of Java are used in Holland and Germany as a styptic, and for stuffing beds, cushions, &c. The hairs of the latter species is imported under the name of *Pakoe Kidang. D. antarctica* of Australia is now a common ornament of our greenhouses, while others are found in Juan Fernandez, Brazil, St Helena, Colombia, and Java.

Dicotyle'dons, Dicotyledo'neæ, Dicotyle'dones, or **Dicotyle'donous Plants,** one of the two great subdivisions of flowering plants, distinguished by the plants having two seed lobes, netted veined leaves, the wood of the stem in concentric circles, and the parts of the flower generally four or five, or multiples of four and five. About 7000 genera and 70,000 species belong to this division, which is again subdivided into—(1) *Thalamifloræ* (q. v.); (2) *Calycifloræ;* (3) *Corollifloræ* (q. v.); (4) *Monochlamydeæ* (q. v.); and sometimes (5) *Gymnospermæ* (q. v.), or naked-seeded plants, all the other divisions having the seeds enclosed in seed-vessels, or *Angiospermous.* Hooker and Bentham add another group intermediate between *Thalamifloræ* and *Corollifloræ,* called *Discifloræ.* See COTYLEDON, ROOT AND STEM.

Dicot'yles. See PECCARY.

Dicra'nium, a genus of Mosses (q. v.), containing numerous species, some of which are very common on the ground, moist rocks, or more rarely on trunks of trees in Britain.

Dicta'tor, in republican Rome, an extraordinary magistrate, with absolute power, appointed, when the state was in great peril, for the execution of some unusual public act, such as the celebration of solemn games. A D. was chosen for six months by one of the consuls, in obedience to a senatorial decree, but was expected to resign on fulfilling the duty for which he was elected. The office was at first confined to patricians, but was afterwards thrown open to the plebs. Although an autocrat in military matters, a D. had to conform to law in civil acts, and when chosen for some special purpose, might be successfully opposed if he sought to control other affairs. It is said that a D. could not spend public money without permission of the senate, and it seems to have been illegal to wield dictatorial power beyond the limits of Italy. A D.'s insignia were four lictors who carried *secures* or axes in their fasces. The office was established, it is said, 501 B.C., fell for a time into disuse, was revived during the second Punic War, after which it became extinct, the prolonged dictatorships of Cæsar and Sulla being unconstitutional. On Cæsar's death the office was abolished.

Dic'tionary (Low Lat. *dictionarium*), a book in which words with their peculiar meanings are arranged in alphabetical order; or, in a wider sense, a book in which a subject, or a

branch of a subject, is treated under heads alphabetically classified. A D. demands a certain definite, systematic arrangement of information, and is thus distinguished from a mere catalogue. A D. of the Greek language is generally spoken of as a *lexicon*, and a D. of geography as a *gazetteer*. The terms *glossary* and *vocabulary* are almost synonymous with a D. of a language. For dictionaries of facts, see ENCYCLOPÆDIA.

Dictionaries of Words.—The earliest of such dictionaries is the *Lexeis Homerikai* or *Homeric Lexicon* of the time of Augustus, but the first which has any pretensions to completeness is the Greek D. of Suidas, a Greek lexicographer of the 11th c. The Latin *Thesaurus* of Robert Estienne (1535), shows a marked advance in D.-making upon the work of Suidas, and the Greek *Thesaurus* of Henri Estienne (1572) has been the basis of succeeding Greek dictionaries. Other dictionaries deserving mention are the *Etymologicum Magnum*, a Greek lexicon of the 10th c., worthless in its etymologies, but a storehouse of interesting and quaint traditions; the *Phraseologia Generalis*—a Latin D.—by W. Robertson (1681); the *Etymologicon Linguæ Latinæ* of Vossius; the Latin D. of Forcellini (Padua, 1771); the Latin D. of Freund. The best Greek and Latin dictionaries recently published in England are the Latin-English D. and English-Latin D. of W. Smith; the Latin-English D. of Riddle and White; the Greek-English Lexicon of Liddell and Scott. Notable polyglot dictionaries are Whiter's *Etymologicon Magnum* (1800–22); Minsheu's *D. of Eleven Languages* (Lond. 1617). Among the best dictionaries of foreign tongues are the *Dictionnaire de l'Académie Française*; the Italian *Vocabolario degli Academici della Crusca*; and the Spanish *Diccionario de la Lengua Castellana compuesto por la Real Academia Española* (Madr. 1726). Among English dictionaries may be specified Elisha Cole's English D. (1677); Booth's *Analytical D. of the English Language*; Johnson's English D. (1755), a really great work, which made an epoch in English D.-making, but which is very defective in etymology; Jamieson's *Etymological D. of the Scottish Language* (1808); Boucher's *Glossary of Archaic and Provincial Words*; Wright's *D. of Obsolete and Provincial English*; Crabb's *Technological D.* (1859); and Webster's *Complete D. of the English Language* (new ed. 1864).

Dic'tum de Ken'ilworth was an edict of Henry III., given at Kenilworth Castle, commuting the penalties incurred by certain rebel barons into five years' rent of their legally forfeited estates.

Dicty'ogens (*Dictyogenæ*), one of Lindley's subclasses of Monocotyledons (q. v.), which, while agreeing with the general characteristics of the class, differ from it in having the wood of their rhizomes arranged in a concentric manner like that of Dicotyledons (q. v.), while the leaves have reticulated or netted veins. *Dioscoreaceæ*, *Smilaceæ*, *Trilliaceæ*, &c., are among the most important orders of D. It may, however, be noted that some *Araceæ* and *Liliaceæ*, not included among D., have also netted veined leaves.

Dic'tys Creten'sis, the alleged author of a Latin history of the Trojan war, which differs widely from Homer, chiefly in excluding all supernatural agency. It is asserted in the preface that the original was composed by D. of Cnossus, who accompanied Idomeneus to the Trojan war, that it was buried in the author's grave till exhumed by an earthquake in the time of Nero, that it was then brought to Rome by one Eupraxis and translated into Greek, from which Greek translation the Latin version was made by Q. Septimius Romanus. All that is actually known about it is, that a Greek work under the name of D. is frequently quoted by the Byzantine writers, which was probably written in Greek about the time of Nero, and afterwards translated into Latin. The chief literary value of the work consists in its being the principal channel through which the legendary lore of Greece flowed into the romances of the middle ages, passing thence into popular tales and ballads. D. is generally printed along with Dares (q. v.). The best edition is that by Diederich (Bonn, 1837).

Dicyn'odon, a genus of extinct reptiles, included by Owen in the fossil order *Anomodontia*. In D. the front portions of the jaws were toothless, and formed a beak-like structure, which probably was invested by a horny sheath. No teeth were developed in the lower jaw, but each half of the upper jaw bore a large tusk-like tooth, which (like the tusks of living elephants, or the front teeth of rodents) grew throughout life from a permanent pulp. This genus—of which *D. lacerticeps* is a familiar species—occurs only in rocks of Triassic (?) age in S. Africa and India. These animals were fitted to move on land, and had well-developed limbs.

Didac'tic Po'etry (Gr. *didaskein*, 'to teach') is that species of poetry which has for its avowed object the instruction, as distinguished from the mere entertainment or gratification, of the reader. Many poems of the highest order, whether lyric, epic, or dramatic in form, are, of course, in a sense D., but the term is generally restricted to such as seek to inculcate information on some definite subject or range of subjects. When the theme is happily chosen, and the work executed in a masterly style, the advantages of verse over prose are undoubted, and the result has been that, in almost all languages, we find an abundance of D. P., embracing an almost endless variety of subjects. Among the Greeks the *Works and Days* of Hesiod; among the Romans the *De Rerum Natura* of Lucretius, the *Georgics* of Virgil, and the *Epistles* and *Satires* of Horace, are notable examples; while numerous D. poems in English and other European tongues have attained to the rank of classics. No small charm is imparted to such works by the skilful introduction of episodes and illustrations, such as the tale of *Aristæus and his Bees*, and the legend of *Orpheus and Eurydice* in the *Georgics*.

Didel'phys. See OPOSSUM.

Di'derot, Denis, a French encyclopædist, born at Langres in October 1713, was the son of a respectable cutler, who had him partly educated for the Church at the Collége d'Harcourt. Declining to enter either the Church or the law, D. supported himself by teaching mathematics, Latin, and Greek. In 1744 he married Mlle. Annette Champion, whom he speedily deserted for the more witty, but less virtuous, Madame de Puisieux. To this period belong his *Pensées Philosophiques* (which was publicly burned) and his *Lettre sur les Aveugles*, which introduced him to Voltaire, who contested its atheistic conclusions, and to the prison of Vincennes, where he was visited by Rousseau (Confess. B. viii.). On his release he formed a lasting attachment for Mlle. Voland: his letters to her, from 1759 to 1774, give a graphic account of the 'family of atheists,' *i.e.*, D'Holbach, Galiani, Grimm, &c. D. now tried the drama, but his plays *Le Père de Famille* and *Le Fils Naturel* were pronounced to be stilted and pretentious failures. In 1758 D. and D'Alembert replanned the great *Encyclopédie*, which till then (7th vol.) had been chiefly a translation from Ephraim Chambers' *English Encyclopædia.* D. wrote the *Prospectus* and the *Système des Connaisances Humaines*, and took charge of the department of history of ancient philosophy. He steadily excluded all Jesuit and Jansenist contributors from the theological department; and after the withdrawal of D'Alembert, confronted alone the storm of opposition which the *Encyclopédie* excited from the court, the Church, the theatre, the Sorbonne, and the law. He had as friends only Madame de Pompadour, M. de Choiseul, and M. de Malesherbes; but he refused Voltaire's advice to fly to Russia, and continued for thirty years to work with the courage of his convictions. He wrote the articles on the mechanical arts; but in his editorship and his occasional compositions he displayed the most wonderful range of information and facility of composition. D. was frequently the dupe of his own good nature, so that he must have died in poverty had the Empress Catherine not pensioned him. Louis XV. declined to help D.'s candidature for the Academy, saying, 'He has too many enemies.' In 1773 he visited his benefactress at St Petersburg. His chief later works are *Jacques le Fataliste*, *La Religieuse*, and *Essai sur les Règnes de Claude et de Néron*. He died 30th July 1784, from a slight stroke of apoplexy. D. had frequently suffered from over-eating. Before his death he had just eaten an apricot, and asked his wife, 'How the deuce that could hurt him?' In spite of the calumnies of La Harpe and the mistakes of Naigeon, D. appears to have been occasionally visited by religious feeling. See his article PROVIDENCE in the *Enclyclopédie*. D. was one of the most industrious and enthusiastic writers of the 18th c., and disseminated his opinions with rare courage and unflagging toil. His works are pregnant, fresh, and vigorous, but he produced no literary masterpiece, his best work being probably his dialogue *Le Neveu de Rameau*, a brilliant realistic satire, which Goethe translated. His style is rambling, opaque, and declamatory, for which he has been called the most

German of French authors. His richness of thought and expression were better seen in conversation than in writing: Marmontel says that to know D. from his writings only, is not to know him at all. There is a complete edition of D.'s works in 15 vols. (Par. 1798), and another in 20 vols. (Par. 1875–77). See Morley's *Diderot* (Lond. 1875), Bersot's article on D. in his *Etudes sur le Dix-huitième Siècle*, Carlyle's *Miscellanies*, and Morley's *Diderot and the Encyclopædists* (1878).

Di'do, or **Elis'sa**, daughter of Agenor or Belus, King of Tyre, married her uncle Sichæus (by some called *Acerbas*), priest of Hercules. Sichæus having been murdered by Pygmalion, the son and successor of Belus, who desired to obtain his immense treasures, the disconsolate D., taking with her her husband's wealth, sailed with some Tyrians, touched at Cyprus, where she secured wives for her followers, and at last safely landed on the African coast. Here she purchased from King Jarbas as much land as could be enclosed by a bull's hide—no small extent of territory, inasmuch as she cut the hide into the narrowest thongs possible—and on the site built Byrsa (Bull's Hide). Strangers flocked to the new colony, which every day acquired greater commercial importance. D. then, with the consent of the Libyans, built Carthage, which rapidly grew in power and prosperity. Then King Jarbas, smitten with the charms of the Tyrian princess, asked her in marriage, and threatened her with war in the event of refusal. D. asked and obtained three months to consider the proposal; but before the expiry of the time she erected a funeral pile, and, sword in hand, offered herself a willing sacrifice to the manes of Sichæus. After her death she was worshipped as a divinity. Ancient writers are not agreed as to the date of the founding of Carthage, but it probably took place from forty to one hundred years before the building of Rome. The anachronism committed by Virgil in the *Episode of Æneas and D.*—one of the most charming creations of antiquity—has been frequently remarked by ancient and modern writers.

Dido, the name of a beautiful genus of *Lepidoptera* or Butterflies, belonging to the family *Nymphalidæ* of that order, and found in Brazil and Guiana. The wings are blackish-brown above, with markings of pale-green, whilst the under surface is chocolate-coloured, with green patches bordered with silvery white. The caterpillars are green, with red and white stripes. The wings in the D. (*Cethosia D.*) have a stretch of 4 or 5 inches.

Di'dot, the name of a famous French family of publishers, printers, and papermakers.—1. **François D.**, born at Paris in 1689, founded (*à l'enseigne de la Bible d'Or, Rue Pavée*) the celebrated firm in his native city, and issued, among other works, Abbé Prévost's *Voyages* in 20 vols. He died November 2, 1757.—2. **François Ambroise D.**, son of François, was born 1730, and carried typography to greater perfection than had been previously known in France. His editions include Longus (2 vols. 1778), Tasso (2 vols. 1784–86), and Bitaubé's translation of Homer (12 vols. 1787–88). He died July 10, 1804.—3. **Pierre François D.** (born 1732, died 1795), was brother of the former, to whose success he greatly contributed by improvements in the manufacture of paper.—4. **Pierre D.**, eldest son of François Ambroise D., born 1760, is principally remembered for his splendid folio editions of Virgil (1798), Horace (1799), and Racine (3 vols. 1801–5), Denon's *Voyage dans la Basse et la Haute Egypte* (2 vols. 1802), and also for Boileau's *Œuvres* (5 vols. 1815), all characterised by faultless orthography and printing. He died December 31, 1853.—5. His brother, **Firmin D.** (born 1764), is well known in connection with the process of stereotyping, which he applied extensively. By this means he vastly reduced the price of books, selling his *Virgil*, a gem of printing, for sevenpence. It enabled him also to issue an immense number of French, Italian, and English classics. He died April 24, 1836.—6. **Henri D.** (born 1765, died 1852), son of Pierre François, had a strong mechanical taste, and acquired some reputation as an engraver. The 'microscopic' letters founded by him are miracles of clearness and delicacy.—7. **D. Saint Léger**, brother of the preceding, manager of the paper factory of Essonne, invented the machine for making the paper called *Sans Fin*. The business long carried on under the name of Firmin Didot Frères is now Firmin Didot Frères, Fils, & Cie. From the enormous catalogue of their publications we may enumerate the *Bibliothèque Française*, *Collection des Classiques Français*, *Bibliothèque des Auteurs Grecs*, the new edition of *Thesaurus Græcæ Linguæ*, and the *Nouvelle Biographie Générale*. See Werdet's *Études Bibliographiques sur la Famille des D.* (Par. 1864).

Didym'ium. This metal accompanies Lanthanum and Cerium (q. v.) in all their compounds found in nature, and derives its name from the circumstance (*didumos*, Gr. 'twins'). D. was discovered in 1841 by Mosander. Its symbol is Di, and its atomic weight 48. Neither D. nor its salts have any practical importance.

Die', St, a town in the department of the Vosges, France, on the Meurthe, 25 miles E.N.E. of Épinal. It is a bishop's see, and has a cathedral and fine church. There are manufactures of cotton, and a trade in corn, cattle, flax, leather, ironmongery, &c. In the neighbourhood are iron and copper mines, papermills, and dyeworks. Pop. (1872) 9454.

Dieff'enbach, Johann Friedrich, a celebrated German surgeon, was born, February 1, 1794, at Königsberg, became Professor of Clinical Surgery at Berlin in 1832, and died November 11, 1847. His chief works are *Chirurg. Erfahrungen* (4 vols. 1829–34), *Durchschneidung der Sehnen und Muskeln* (1841), and *Die Operative Chirurgie* (2 vols. 1844–49), the last unquestionably placing him among the first surgeons of the world.

Die'go, San, a town of California, at the southern extremity of the state. It has one of the best harbours on the Pacific coast, 6 miles long, with a depth of 6 or 7 fathoms close to the shore. The town is divided into the old or Spanish, and the new or American. There is a trade in hides, tallow, fish, and salt; and gold, copper, quicksilver, and coal are said to be found. Pop. (1870) 2300.

Dielec'tric, the name given by Faraday to the medium which separates two conductors of electricity, and through which Induction (q. v.) acts. Faraday discovered that the charge induced upon a conductor, placed at a given distance from a charged conductor, varied with the D. employed, being dependent upon what he termed the specific inductive capacity of the D. He was thus led to the conception of the theory of action through a medium. Specific inductive capacity is the induction across any surface due to unit normal charge, and is therefore unity for air, since in this case the induction is equal to the charge. A complete discussion of the theory of the D. and of action through a medium will be found in Clerk Maxwell's *Electricity and Magnetism* (2 vols., Clarendon Press, Oxf. 1873).

Dielyt'ra. See DICENTRA.

Diep'enbeck, Abraham Van, a Dutch painter, born at Hertogenbosch (Bois-le-Duc) in 1607, became famous as the first painter on glass of his time, but abandoning glass-painting, entered the school of Rubens at Antwerp, devoting himself to study under that master. After a tour in Italy he returned to Antwerp, and re-entered the studio of Rubens in the capacity of assistant in 1641. His versatility was great, and, besides such pictures as his 'Crucifixion' (at Coblentz), his 'Elizabeth and Clelia' (Berlin), &c., he showed excellent taste and great facility in painting on tapestry and panelling, and in designing title-pages and other decorative work. His 'Temple of the Muses,' a series of fifty-nine designs from Ovid's *Metamorphosis*, and a work of great genius, was reproduced in copperplate by the best engravers of the time. His colouring and composition were excellent, his ingenuity exhaustless, but his work was always hurried and wanting in finish. Many examples of his glass-paintings are preserved at Antwerp. In 1641 he was elected Director of the Academy at Antwerp, where he died in 1675. See Decamps, *Vies des Peintres Hollandais*.

Dieppe' (Old Norse, *Duipa*, 'the deep water'), a seaport and watering-place of France, department of Seine-Inférieure, at the mouth of the Arques, here divided into two streams, 45 miles N. of Rouen by railway. It is a fortified town of the fourth rank, the seat of a tribunal of the first instance, and of a communal college; has a Gothic church, St Jacques, dating from the end of the 13th c., the beautiful church of St Remy, a castle of the 15th c., two hospitals, an exchange, and a theatre. There are elegant bathing *établissements*, and several public squares, numerous fountains, fine quays, and promenades. The harbour consists of three basins, admits vessels of 1200 tons, and annually receives some 4000 vessels of 500,000 tons. There

is a regular steam service with Newhaven, and great numbers of Englishmen pass through D. on their route for Rouen and Paris. The exports are cottons, silks, woollens, fruits, &c., and the imports iron, steel, coal, and timber. D. has manufactures of lace, articles of ivory and bone, as also shipbuilding yards, sugar-refineries, distilleries, and sawmills. Its leading industry is, perhaps, in herring and cod fisheries, and in the management of the enormous beds of oysters in the vicinity. Pop. (1872) 20,160. To the W. of D. lies the suburb of Pollet, remarkable for the entire contrast its inhabitants present to those of Upper Normandy in speech, dress, and manners, on which account they have been taken for the descendants of the Saxons who settled here in the times of the Merwings. D. is first known historically in 1196, and subsequently became a flourishing French port. It rose to the height of its prosperity under François I. The ships which carried the first French colonists to Canada sailed hence. But the fortunes of D. sank with the revocation of the Edict of Nantes (1685), and the town was all but destroyed by the English and Dutch forces, July 17, 1694. It was rebuilt by royal command on the Peace of Ryswijk, and again bombarded by the English, 14th September 1803. The Germans, under Manteuffel, seized D. 9th December 1870.

Die-Sinking, the art of producing a design, usually incised, on a block of steel, called a die, which forms a matrix for the reproduction of a number of identical dies, used in striking medals, &c. The art is best displayed in the making of medals and coins. A piece of fine-grained steel is fashioned into a rough die-block, and is strengthened by a ring of iron to prevent its cracking. The rough die-block having been softened by annealing, and a smooth surface formed on it on the lathe, the die-sinker sketches and engraves in outline his design upon it. After delicate manipulation with differently shaped tools or gravers of many sizes, he produces a finished 'matrix.' While the die is being engraved, technically called 'roughed,' the die-sinker takes frequent casts in clay or type-metal to test the correctness and progress of the work. A number of duplicate dies are prepared, as injury might result to the original from continual use in the press. The first step in the multiplication of dies is to harden the matrix by protecting the design with a charcoal paste, heating the steel to a bright cherry-red, and then exposing it to a falling stream of water. It is next cleaned, tempered by being raised to a certain temperature, and slowly cooled in oil or water, and 'lapped,' or polished. A piece of steel of the same quality as the die is now turned on the lathe to the form of a truncated cone, made quite smooth, and carefully annealed. The matrix being placed beneath a powerful press, the narrow end of the annealed piece of steel or 'punch' is placed upon it, and by a succession of light blows is sunk into the matrix till the design appears in perfect relief upon the punch. The blows require to be slight, as the punch is apt to crack, and softens after each blow. From the punch, which is strengthened with an iron collar and hardened, a series of impressions are obtained on soft steel, and from these, subsequently hardened, the medals or coins are struck by means of a press. All metals except tin have to be annealed after each blow in the press to prevent cracking. Dies for stamping note-paper, &c., and for fine kinds of metal ornaments, are prepared by the die-sinker. For inferior stamped metal ornaments the dies are chiefly cast, and afterwards touched up with a graver.

Di'es Incep'tus pro Comple'to Habe'tur, a legal maxim signifying that a day begun is a day ended. See COMPUTATION OF TIME.

Di'es I'ræ, the name given (from the opening words) to the great Latin hymn on the judgment-day—the crowning effort of mediæval piety in song. The modern world has nothing comparable to it in awe-stricken devotion and hallowed fear. The hymn has been ascribed to the General of the Minorite Order, Matthäus Aquasparta (died 1302), to Cardinal Frangipani (died 1294), to Malabranca, Bishop of Ostia (1274), to Bonaventura (q. v.), to St Bernard (q. v.), and even to Gregory the Great (q. v.). But Luke Wadding, the learned historian of the Franciscan Order (*Annales Minor.*, Lugd. 1625), assigns the authorship to Thomas of Celano, a native of the Abruzzi, and pupil and friend of St Francis of Assisi. Thomas died about the middle of the 13th c., and his name is first mentioned in connection with the poem about the end of the 14th c. There are three different texts of the D. I.—(1) That of the Roman Missal, which is the one best known; (2) the Mantuan; (3) that given to the Cathedral of Zürich (about 1475) by Felix Malleolus (Ger. *Hämmerlein*), Provost of Solothurn and Chorherrn. The relative value of these texts is still the subject of critical discussion. The hymn itself first became part of the liturgy of the Church in the latter half of the 14th c. It has been repeatedly translated into German, English, and other tongues. Lisco, in his monographs on the D. I. and the *Stabat Mater* (Berl. 1840–43), enumerates sixty versions of the former, of which August Wilhelm von Schlegel's is probably the best. Crashaw, Macaulay, and Lord Lindsay are among those who have tried to render it into English.

Di'esis, in music, a small interval (vibr. fraction, $\frac{128}{125}$) occurring under the same circumstances as *Diaschisma* (q. v.).

Diest, a strongly fortified town in the province of S. Brabant, Belgium, 32 miles E.N.E. of Brussels, with manufactures of hosiery, beer, and gin. The Church of St Sulpitius is the only building of note. Pop. 7720.

Die'terichs, Joachim Friedrich Christian, a great veterinary surgeon, was born at Stendal, Prussia, 1st March 1792, entered the Veterinary College of Berlin as a bursar in 1813, and, after examination, was named in 1817 superior veterinary surgeon. He was sent to France at the expense of the Government to study stud-keeping and horse-breeding, and pursued the same study further in Wurtemberg, Bavaria, Austria, and Hungary. On his return he occupied a chair in the Veterinary College of Berlin till 1823, was appointed to a post in the General Military School of Berlin in 1830, and appointed Professor in Ordinary in 1841. His works, which have been translated into various languages, are widely used in Germany. Among them are *Handbuch der Veterinaer-Chirurgie* (Berl. 1822, 6th ed. 1845); *Ueber die Hulfbeschlagkunst* (Berl. 1823); *Handbuch der Speciellen Pathologie und Therapie für Landwirthe und Thierärzte* (Berl. 1828, 3d ed. 1851); *Handbuch der Geburtshülfe* (Berl. 1845); *Benennungen der einzelnen Regionen und Theile des äussern Pferdekörpers* (Berl. 1853), &c.

Dietet'ics is that department of science which treats of food. The question of the kind of food best suited for man may be treated either theoretically or practically. Theoretically, food may be considered as consisting of various alimentary or proximate principles, each of which has specific physiological properties; or practically food may be regarded as composed of these collectively, in such proportions and in such physical states as fit the food for the maintenance of life. It is the practical aspect of the question of food which forms the subject of D. As an example of a natural food, take milk. It contains the following alimentary principles:—Nitrogenous matter (casein chiefly, with small quantities of other albumenoid matter), fatty matter or butter, a carbo-hydrate in the form of sugar of milk (lactine), and inorganic matter comprising salts and water. Here we find a combination of principles present, designed in the economy of nature for the purpose of sustaining life during an early period of mammalian existence. An egg is another example of a compound food or material containing all the principles necessary for the development and growth of the body of the chick. It has also been shown by experiment that food containing a combination of principles is required to nourish the body of an animal. Thus gelatine, albumen, fibrine, and fat, taken separately, nourish animals for a very limited period, and in an incomplete manner. A truly nutritious food must contain a mixture of these, along with saline materials and water. In addition, a certain amount of sapidity or flavour is required to make the food palatable.

The nature of the food required by a healthy man is also affected by the exigencies of the climate in which he lives, and by his habits of life. Exercise and exposure to cold increase the demand for food, while a state of inactivity and a warm climate have usually the opposite effect. Again, dwellers in the Arctic regions consume an enormous quantity of the most efficient kind of heat-producing material—oleaginous matter, or fat,—while the inhabitants of the tropics live chiefly on vegetable products containing principles, such as starch, belonging to the carbo-hydrate group of bodies. In a temperate clime, we find men living more on a mixed diet. The following table by Moleschott may be regarded as representing the necessary combination of alimentary principles for maintaining health, in a

person of average height and weight, in a temperate climate, and with a moderate amount of either nervous or muscular work :—

Dry Food.	In oz. avoir.	In grains.
Albuminous matter	4.587	2006
Fatty matter	2.964	1296
Carbo-hydrates, such as starch, sugar, &c.	14.250	6234
Salts	1.058	462
	22.859	9998

Water from 50 to 80 ounces. The 23 ounces of water-free material correspond to about 42 oz. of ordinary food. For a healthy average-sized man, doing a moderate amount of work, a sufficient diet of ordinary food would consist of about 8 oz. for breakfast, 6 oz. for luncheon, and 16 oz. for dinner—in all, 30 oz.

When we examine the dietaries of persons engaged in various ways, we find a correspondence between the work done and the food consumed, and here, as has been well said, there is a harmony between the dictates of experience and the suggestions of science. In order to ascertain the value of any dietary, the composition of the constituent articles requires to be known. The following table, compiled from Dr Letheby's Cantor *Lectures on Food* (1870, 1st ed. p. 6), represents the percentage composition of several of the more common articles of diet :—

	Water.	Albumen.	Starch	Sugar.	Fat.	Salts
Bread	37	8.1	47.4	3.6	1.6	2.3
Biscuit	8	15.6	73.4		1.3	1.7
Wheat flour	15	10.8	66.3	4.2	2.0	1.7
Oatmeal	15	12.6	58.4	5.4	5.6	3.0
Rice	13	6.3	79.1	0.4	0.7	0.5
Peas	15	23.0	55.4	2.0	2.1	2.5
Potatoes	75	2.1	18.8	3.2	0.2	1.0
Arrowroot	18	...	82.0	...	...	...
Turnips	91	1.2	5.1	2.1	...	0.6
Cabbage	91	2.0	5.0	3.0	0.5	0.7
New milk	86	4.1	...	5.2	3.9	0.8
Cream	66	2.7	...	2.8	26.7	1.8
Cheese	36.8	33.5	...	...	24.3	5.4
Lean beef	72	19.3	...	...	3.6	5.1
Fat beef	51	14.8	...	...	29.8	4.4
Mutton	72	18.3	...	...	4.9	4.8
Veal	63	16.5	...	...	15.8	4.7
Fat pork	39	9.8	...	...	48.9	2.3
Tripe	68	13.2	...	...	16.4	2.4
Poultry	74	21.0	...	...	3.8	1.2
White fish	78	18.1	...	...	2.9	1.0
Salmon	77	16.1	...	...	5.5	1.4
Egg	74	14.0	...	...	10.5	1.5
Butter	15	...	...	...	83.0	2.0
Beer and porter	91	0.1	...	8.7	...	0.2

The following table shows the relation between the amount in ounces of dry food and the habits of life of the individual :—

	Nitrogenous matter.	Fat.	Carbo-hydrates.	Mineral matter.
	oz.	oz.	oz.	oz.
Bare subsistence—diet as in prisons, hospitals, &c.	2.33	0.84	11.69	...
Adult in full health, with moderate exercise	4.215	1.397	18.960	0.714
Active labourers, such as soldiers during war	5.41	2.41	17.92	0.68
Hard-working labourers, such as navvies	5.64	2.34	20.41	0.72

As regards the effect of animal and vegetable food on the system, the following statements may be made :—(1) Animal food increases the amount of fibrin in the blood, renders the blood richer in red corpuscles, and produces firmness of muscle with an absence of superfluous fat. (2) Vegetable food increases the deposition of fat, is less stimulating than animal food, and appeases hunger for only a short time; otherwise its nutritious value, if capable of being digested, is quite as great.

Diet of Infants.—The proper food for an infant is the milk of the mother. Failing this, the nearest approach to the best food is the milk of another woman. A wet-nurse should be free from constitutional taint, and in a healthy condition. Her milk should be sufficient in quantity and good in quality, and she should have borne a child about the same time as the mother of the infant given into her charge. But if no wet-nurse can be got, the next best substitute for the mother's milk is the milk of the cow. This milk, as seen in the following table, is the nearest approach to what is wanted, and it is easily procurable :—

	Milk of			
	Woman.	Cow.	Goat.	Ass.
Nitrogenous matter	3.35	4.55	4.50	1.70
Butter	3.34	3.70	4.10	1.40
Sugar and salts	3.77*	5.35	5.80	6.40
Water	89.54	86.40	85.60	90.50
	100.00	100.00	100.00	100.00

* Understated.

To render cow's milk suitable for the infant, it is usually diluted with water and sweetened with sugar. Farinaceous food, consisting of bread, biscuit-powder, flour, rusks, &c., are not really suitable for infant life, although much used. Liebig's food, derived from malt-flour, wheat-flour, cow's milk, bicarbonate of potash and water, is more suitable. As regards practical dietetics and the food for invalids suffering from various diseases, see Dr. Pavy's *Treatise on Food and Dietetics* (2d ed. Lond. 1875).

Die'trich of Bern, one of the characters in the old German epic the *Niebelungen Lied* (q. v.), and a favourite hero in German legend and song. In the *Niebelungen Lied* he is one of Etzel's (Attila's) chief vassals, and revenges the death of Siegfried by bringing Gunther, the Burgundian king, and Hagen, Siegfried's murderer, captive to Queen Chriemhilt. D. is only of secondary importance in the *Niebelungen Lied*, but is the central figure in a great cycle of Gothic tales. In the *Heldenbuch*, or *Book of Heroes*, written by Wolfram von Eschenbach and Heinrich von Ofterdingen, D. is represented as seeking adventures in a fairyland in the Tyrol, and as riding to Chriemhilt's rose-garden, and forcing the almost invulnerable Siegfried to hide beneath Chriemhilt's veil. Other sagas tell how D. was head of a band of heroes, and was crowned Emperor of Rome. In the comparatively late tale of *D. and Sigenot*, D. is shut up in a tower, and, like Ragnor Lodbrog, is attacked by snakes, but escapes. The story of *D. and Ecke* greatly resembles the Volsunga saga, and, according to some, can be connected with the *Iliad*. It paints D. as the bravest of all warriors, and as beloved by the beautiful Queen Seburk, whose pleading for D.'s life, according to Mr Cox (*Mythology of the Aryan Nations*, i. 305), symbolises the Dawn pleading for the life of the Sun. D. likewise appears in German legend as a ghostly midnight hunter, answering to King Hugh in France and Herne the Hunter in England. This heroic and mythical D., or Thiderick, is identified with the great Ostrogothic conqueror Theodoric of Verona (q. v.). See Ludlow's *Popular Epics of the Middle Ages*.

Di'ets of Compear'ance, in the law of Scotland, are the days on which a party to a civil or criminal process is cited to appear in court. In criminal cases, the indictment, or Criminal Letters (q. v.), must be called on the precise day for which the accused is cited. See SUMMONS, INDICTMENT, INDUCIÆ LEGALES.

Diez, Friedrich Christian, an illustrious Romance scholar, was born at Giessen, March 15, 1794. After serving as a volunteer against Napoleon in 1813, and living as a private tutor at Utrecht, he went to Bonn in 1822, where he was appointed Professor of Modern Literature in 1830. He died 2d June 1876. By his two great works, *Grammatik der Romanischen Sprachen* (Bonn, 3 vols. 1836-42, 3d ed. 1876), and *Etymologisches Wörterbuch der Roman Sprachen* (Bonn, 1853, 2d ed. 2 vols. 1861-62, 4th ed. 1878), which have been translated into English and French. D. founded the philology of the Romance languages. Among his other works are *Die Poesie der Troubadours* (1826), and *Ueber die erste Portug. Kunst und Hofpoesie* (1863). A 'D. Memorial,' in the shape of scholarships for the studies to which his life was devoted, was established in 1878.

Differences, in heraldry, devices to indicate feudal alliance and dependency, but not blood-relationship. Another view is

that D. are used by the brothers and other descendants of a family after the death of their father, while marks of Cadency (q. v.) are employed during his lifetime. D. are effected in ways innumerable, by modifications of tincture and of all the charges—ordinaries, sub-ordinaries, and miscellaneous. Women cannot bear D.

Differences, Calculus of Finite, a branch of pure algebra, of the greatest importance in the discussion of series and questions of annuities, &c. The law which the successive terms of many series, at first sight very irregular, follow, is made quite evident by taking what are known as successive differences. The following numbers give an example of this—

Series,	18		27		40		58		82		113		152
First differences,		9		13		18		24		31		39	
Second differences,			4		5		6		7		8		
Third differences,				1		1		1		1			

The law is evident in the row of second D., while the fourth obviously vanish. It is apparent, then, that given any term and the corresponding differences, the other terms can be calculated. The two fundamental formulæ are—

$$u_{x+n} = u_x + n\,\Delta u_x + \frac{n(n-1)}{1.2}\,\Delta^2 u_x + \ldots.$$

and

$$\Delta^n u_x = u_{x+n} - n u_{x+n-1} + \frac{n(n-1)}{1.2} u_{x+n-2} + \ldots. + (-1)^n u_x$$

where u_{x+n}, u_x, &c., are the $(x+n)$th, xth, &c., term of the series $u_1 + u_2 + u_3 + \ldots$, and where $\Delta u_x = u_{x+1} - u_x$, $\Delta^2 u_x = \Delta\Delta u_x = \Delta u_{x+1} - \Delta u_x$, &c. For the proof and application of these, the reader is referred to De Morgan's *Differential and Integral Calculus*, and to Boole's *Treatise on the C. of F. D.*

Differen'tial, in music, is a third note produced when any two tones are sounded simultaneously. Its pitch is that corresponding to the *difference between the number of vibrations* of the two primaries. The D. has an important effect on the consonance of certain intervals. See CONSONANCE.

Differential Calcu'lus. See CALCULUS.

Differential Equa'tions are equations in which differential coëfficients of the variable quantities enter. They are divided into two classes, *ordinary* and *partial*—the former having only one independent variable, the latter more than one. D. E. are also distinguished by their *order* and *degree*—the order being that of the highest differential coefficient present, and the degree corresponding to the highest power to which any differential coefficient is raised. Thus $\left(\frac{d^3y}{dx^3}\right)^2 + a\frac{dy}{dx} + x = b$ is of the third order and second degree. If X, X_1, X_2, &c., be functions only of x, the equation

$$\frac{d^ny}{dx^n} + X_1\frac{d^{n-1}y}{dx^{n-1}} + X_2\frac{d^{n-2}y}{dx^{n-2}} + \ldots. + X_n y = X$$

is called a linear equation of the nth order, the dependent variable y and its derivatives being all of the first degree. Such equations are of great importance, being of very frequent occurrence in physical problems. The standard treatise on the subject is Boole's *D. E.*; while the chapter in De Morgan's *Calculus* is very complete and well worthy of study.

Differential Thermometer. See THERMOMETER.

Diffrac'tion, or according to Newton *Inflexion*, is an optical phenomenon which takes place when a ray of light passes very close to an opaque body. It was first observed by Grimaldi, and much studied by Newton, who supposed it to be due to a kind of molecular force subsisting between the opaque body and the light corpuscles. Let a narrow beam of sunlight, entering a darkened room, fall upon a plate which is perforated by an exceedingly small hole or slit. If the light transmitted through this minute aperture be received upon a white wall or sheet, the small light-spot will be surrounded by several concentric rings of coloured light with intermediate rings of darkness. The experiment may be varied so as to present most startling and beautiful phenomena, all of which, however, can be explained upon the undulatory theory of light with a simplicity almost inconceivable. D. is, in fact, a case of Interference (q. v.). If a small opaque disc be interposed in a beam of sunlight, the shadow cast is found to have a small bright spot in the centre. This is another case of D.; and a general idea of the manner in which it is explained may be got from a consideration of the effect an obstacle has upon a wave travelling along the surface of a sheet of water. Where the crests of the two halves so formed meet, a larger wave will be produced, but where crest meets hollow, there will be no wave apparent; and darkness is the absence of that undulatory motion which constitutes light. The complete explanation requires the aid of higher mathematics, for which we refer to Fresnel's memoir before the Academy of Sciences *Sur la D. de la Lumière* (1826). A *D.-grating* is a transparent surface ruled with numerous lines, so close that they cannot be singly observed. By means of such an apparatus a series of most perfect spectra is obtained when a beam of sunlight, transmitted through it, is received upon a screen. These spectra are free from the objection which holds for prismatic spectra, that the violet portion is too much extended. Further, it is easily demonstrable, upon the principles of interference, that the distance of any portion of the spectrum from that point on the screen which is in the same line with the sunbeam and the centre of the grating, is proportional to the wave-length of the light at that part of the spectrum. This greatly increases the value of such gratings, which are, however, exceedingly scarce.

Diffu'sion, the gradual intermingling of two liquids or gases. If over a strong and coloured saline solution, such as sulphate of copper, or bichromate of potash, water be poured gently so as not to disturb the solution, the process of D. will become very apparent. For measuring the rate of D., however, this method is not sufficiently exact. Sir William Thomson employs a number of glass beads, whose specific gravities are different, but all intermediate between those of the two liquids. As D. goes on the beads gradually separate, and indicate by their positions the specific gravity at any depth of the solution. Another method adopted by the same physicist is to measure the refractive indices of the various layers of the diffusing liquids. There are many pairs of liquids, such as water and oil, which do not mix, and therefore do not diffuse, and there are others in which the D. is only partial, the final result being the lighter liquid mixed with a small proportion of the heavier floating upon, and distinctly marked off from, the heavier liqnid, mixed with a small proportion of the lighter. This is the case with ether and water.

Every gas is capable of D. into every other gas—a fact first remarked by Priestley. Graham, who investigated the phenomenon thoroughly, has shown that the rate at which the D. of any substance goes on is proportional to the rate of variation of the strength of that substance in the fluid as we pass along in the direction of the D.; exactly the law which holds for conduction of heat and electricity. He also deduced from his experiments that the rates of D. of two gases are inversely proportional to the square roots of their densities—the lightest diffusing most rapidly. If a porous solid be intercepted between the two gases, D. takes place, according to Graham, in the same way that it would have done if there had been no septum present; Bunsen, however, regards the phenomenon as dependent upon capillarity, and doubts the truth of Graham's law of densities. There is another class of cases, differing from the last in the fact that the diaphragm is not in the ordinary sense porous. Thus, if a soap-bubble be blown with carbonic acid gas, the gas is continually passing through—being absorbed on the interior surface, passed in a state of solution through the film, and given off at the exterior surface. Hydrogen and other gases behave similarly with respect to caoutchouc; but their rates of passage have no connection with those of ordinary D., being rather a chemical than a mechanical action.

Graham distinguished what he called *colloïd* and *crystalloïd* substances; the former being capable of uniting temporarily and loosely in various proportions with other substances, the latter always combining in definite proportions. Glue is a *colloïd* body, forming a jelly with various proportions of water; salts are *crystalloïd*. They are easily distinguished by the difficulty with which all colloïd bodies diffuse through a porous solid, crystalloïds diffusing with ease. If a colloïd substance be combined with some liquid or crystalloïd solution in different proportions throughout its mass, D. takes place through the colloïd body till

the structure is homogeneous—an interesting analogy to the tendency which an unequally heated body has to come to a uniform temperature. It is on this theory that Graham explains the passage of hydrogen through iron and palladium at a high temperature, the metals acting, with respect to the gas, as colloïd substances. See Graham's *Memoirs* in the *Philosophical Transactions* prior to 1851, Graham's *Chemistry*, Bunsen's *Gasometry*, translated by Roscoe, and Clerk Maxwell's *Theory of Heat.*

Digamma, a letter once occupying the sixth place in the Greek alphabet, which gradually fell into entire disuse. It was called D., *i.e.*, double gamma, from its resemblance to two gammas placed one on the other, Ϝ F. The D. existed in the time of Homer, but is not found written in any extant copy. In pronunciation it answered to the English *v.* The manner of its disappearance may be illustrated by a comparison of the Greek *'aiōn, oinos*, with the Latin *ævum, vinum.*

Dig'by, a seaport in the Dominion of Canada, province of Nova Scotia, on the Bay of Fundy. It has an active industry in the curing of pilchards, which are prized on account of their flavour, and are known as *Digbies* in the fish trade. There are also valuable herring and mackerel fisheries, and some ship-building and lumbering. Pop. (1871) 1300.

Digby, Sir Kenelme, the son of Sir Everard D., one of the men who suffered for participation in the Gunpowder Plot, was born 11th July 1603, at Gothorst, in Buckinghamshire. He distinguished himself at Oxford, and after two years' travel on the Continent, was knighted by James I. Charles I. appointed him to numerous offices, and in 1628 he sailed with a squadron to the Levant, where he defeated the Venetians. He also fought with the Algerines. Originally a Protestant, T. became, in 1636, a Roman Catholic. When the civil war commenced he was imprisoned as a Royalist, but was released in 1643. For a long time he resided and studied in France, returning to London in 1661, and dying there, 11th June 1665. D., who was a learned man, and an adherent of what is known as 'the corpuscular philosophy,' is the author of numerous works, including *A Treatise of the Nature of Bodies*, an interpretation of *The Twenty-second Stanza in the Second Book of Spenser's Faerie Queene*, and *Two Treatises on the Nature of Bodies and of Man's Soule.* His private memoirs were published in 1827.

Di'gest, the name given to the Pandects of the civil or Roman law, as containing *Legalia præcepta excellenter digesta.* See CODE.

Diges'ter, Papin's, a strong metallic vessel, tightly fitted with a lid, and provided with a safety valve. It is used for subjecting bodies to a higher temperature than could be obtained by merely boiling water in the usual way; for the steam, being unable to escape, increases the pressure upon the water, the boiling-point of which is consequently raised.

Diges'tion. This is a term given to the processes by which the food is changed into a condition suitable for being absorbed into the blood-vessels or by the lacteals. During the course of D. the food is changed physically and chemically; it passes through various organs, and it is acted on by various juices. In the mouth the food is divided and comminuted by the teeth. It is mixed, at the same time, with the various fluids which compose the saliva. Having been reduced to a pulpy mass, it is, by the action of the tongue, passed backwards into the pharynx, and by the successive contractions of the muscles of the pharynx it is propelled into the œsophagus. This tube leads from the pharynx into the stomach, which is a receptacle for the food, and the cavity in which the chief digestive processes occur. In the stomach the food is subjected to three actions:—(1) To a triturating movement, effected by the contractions of the muscular walls of the stomach, by which it is thoroughly mixed with the juice secreted by glands in the lining membrane of that organ, called the *gastric juice;* (2) to the chemical action of the gastric juice; and (3) to the influence of a temperature of about 100° F. The food is thus further reduced into a pultaceous or gruel-like mass called *chyme*, and as it is partly liquified, portions successively pass into the small intestine (see STOMACH), while the larger masses are left behind in the stomach to be further acted upon. In the small intestine (see INTESTINE), which is about 15 to 20 feet in length, the chyme is mixed, as it is slowly propelled along the bowel, with—(1) The intestinal juice; (2) the bile; and (3) the pancreatic juice. By these juices certain of the constituents of the food are further acted upon, and the alimentary matters, thus liquified and prepared, are gradually absorbed by the blood-vessels of the intestinal mucous membrane and by the lacteals, and become *chyle.* The indigestible portion of the food is passed by the muscular action of the walls of the small intestine (see PERISTALTIC ACTION) into the large intestine, from which, with certain refuse or excrementitious substances, it is expelled by the act of Defæcation (q. v.).

The action of the various digestive fluids on the proximate constituents of food may here be briefly summarised, while reference is made, as to the structure of the various organs and as to the composition of the various fluids, to the following headings:—MOUTH, PHARYNX, DEGLUTITION, ŒSOPHAGUS, STOMACH, GASTRIC JUICE, INTESTINE, LIVER, SALIVA, and PANCREAS. Five digestive fluids act on the food:—

(1.) *Saliva*, which converts starch into sugar, and assists in Deglutition or Swallowing (q v.).

(2.) *Gastric juice*, which acts on the albuminous matters, converting them into *Peptones* (q. v.), or soluble modifications of albumen.

(3.) *Bile*, which separates the refuse from the nutritious matter of the chyme, neutralises any excessive acidity of the chyme caused by the gastric juice, aids in the absorption of fat by covering the surface of the mucous membrane with an alkaline fluid, stimulates the peristaltic action of the bowels, and arrests putrefactive changes. See BILE, LIVER.

(4.) *Pancreatic juice*, which emulsionises fatty matter, splits up certain fats into glycerine and the corresponding fatty acid, converts starchy matter into sugar, and converts peptones into two substances called Leucine and Tyrosine (q. v.), which are then absorbed and taken to the liver.

(5.) *Intestinal juice*, which, so far as is known, combines the actions of all the other juices, and acts on the albuminous, starchy, and fatty principles.

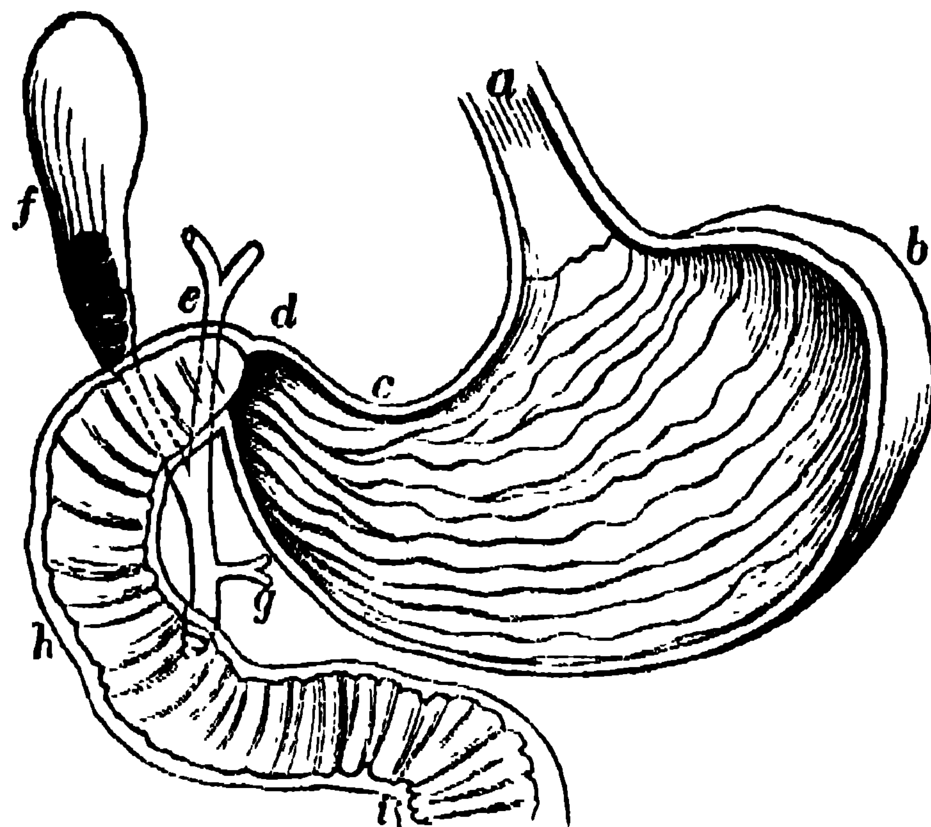
The conditions favourable for good D. in the stomach are—(1) A temperature of about 100° F.; (2) constant movement of the walls, which brings in succession every part of the food in contact with the mucous membrane and gastric juice; (3) the removal of such portions as have been fully digested, so that what remains undigested may be brought more completely into contact with the solvent fluid; and (4) a state of softness and minute division of the aliment.

According to the celebrated experiments of Dr Beaumont upon St Martin, a Canadian, who, on 6th June 1822, met with a severe gunshot injury, the result of which was a permanent fistula or opening into the stomach, the rapidity of D. varies according as the food is more minutely divided, whereby the extent of surface with which the gastric fluid can come in contact with it is proportionally increased. Liquid substances are for the most part absorbed by the vessels of the stomach at once, and any solid matters suspended in the liquid, as in soup, are concentrated into a thicker material before the gastric juice acts upon them. A full meal, consisting of animal and vegetable substances, may be converted into chyme in about an hour, and the stomach may be left empty in two and a half. Rice and tripe, in St Martin's case, were digested in about 1 hour; eggs, salmon, trout, venison, and apples, in 1½ hours; tapioca, barley, milk, liver, and white fish, in 2 hours; turkey, lamb, and pork, in 2½ hours; beef, mutton, and fowls, in 3½ hours; and veal in about 4 hours. The following circumstances no doubt also affect D.:—(1) The quantity of food taken—the stomach should be moderately filled, but not distended; (2) the time which has elapsed since the last meal, which should be always long enough for the food of one meal to have completely left the stomach before more is introduced; (3) the amount of exercise previous and subsequent to a meal, gentle exercise being favourable and over-exertion injurious to D.; (4) the state of mind, tranquillity of temper being usually essential to quick and due D.; (5) the bodily health; (6) the state of the weather; (7) the period of life, D. being more active in the young than in the old.

The quantity of digestive fluids secreted daily, according to the estimates of Bidder and Schmidt, which are probably (with the exception of the last two) at least 25 per cent. too high, is, in pounds avoirdupois:—Saliva, 3·5; bile, 3·5; gastric juice, 14·1; pancreatic juice, 0·44; intestinal, 0·44.

The survey of the digestive functions throughout the animal series leads us to contemplate very wide variations in the form and complexity of the assimilative apparatus. In the Protozoa (q. v.), or lowest animals, the bodies of which are com-

posed of the simple albuminous substance known as Sarcode or Protoplasm (q. v.), food particles are taken into the interior of the body, and are there digested amid the protoplasmic



THE STOMACH LAID OPEN BEHIND.

a, the œsophagus; *b*, the cardiac dilatation; *c*, the lesser curvature; *d*, the pylorus; *e*, the biliary duct; *f*, the gall-bladder; *g*, the pancreatic duct, opening in common with the cystic duct opposite, *h*; *h*, *i*, the duodenum.

substance. This substance, therefore, constituting of itself a living being, assumes the functions of a digestive system. Even in these lower animals, an essential difference from plants may be perceived in the process of D., in that they receive their nutritive matters within their bodies, and digest them internally, whilst in plants the process of nutrition goes on in the external surfaces and outer tissues of the organisms. Some of the protozoa (*e.g.*, *Gregarinæ*), and some more highly organised animals also (*e.g.*, tapeworms), live by simple imbibition—that is, by simply absorbing the fluids on which they subsist. And in such forms no distinct or specialised mouth, stomach, or other digestive apparatus exists. In none of the protozoa, except in the Infusorial (q. v.) animalcules, does a mouth exist; and in the latter no digestive system is specialised, food being digested by the protoplasm of which the body is composed. In the Cœlenterate animals (represented by the hydræ, sea-anemones, zoophytes, corals, &c.), a stomach-sac may be wanting, as in all Hydrozoa, and food is digested simply within the general cavity of the body. But in the sea-anemones and other actinozoa a distinct stomach-sac is specialised, although this latter structure is open inferiorly, and communicates thus with the body-cavity. Tentacles are also now found, by means of which the food is drawn towards the mouth-opening, which is always developed. In Annuloida or echinozoal animals (such as sea-urchins, starfishes, sea-cucumbers, &c.), a perfect digestive system is usually to be found, although, as in the tapeworms, already noticed, a digestive apparatus may be wanting, possibly in consequence of their degraded condition as internal parasites. In Annulosa (such as worms) the digestive system is of tolerably perfect structure, and when we advance to the higher members of the latter sub-kingdom (such as insects, spiders, crustacea, &c.), we find not only a perfect digestive apparatus, but many supplementary organs in addition. In insects, a crop and gizzard, stomach, intestine, biliary or liver tubes are found, with a heart and blood-vessels for the circulation of the nutritive fluid. In higher crustacea, such as lobsters, &c., the digestive structures become still further specialised, the liver especially becoming better developed. In Mollusca (such as cuttlefishes, snails, oysters, &c.), salivary glands, teeth-like structures for the trituration of the food, and a large liver exist. In Vertebrata, and among fishes representing the lowest group of the class, the digestive system may include not only a mouth, teeth, stomach, and intestine, but also a liver, pancreas or sweetbread, and other structures. In Amphibia (q. v.) a spleen is also present, and in reptiles some further specialisation exists. In birds no teeth are developed; but a gullet, crop, gizzard, and proventriculus or true stomach, together with an intestine, intestinal cæca, liver, pancreas, spleen, and other glands are found.

It may be noted that vertebrates differ from all lower animals in possessing a distinctly developed lacteal or Absorbent System, that is, a special system of vessels, the function of which is to receive the products of D. from the digestive canal and transfer them to the blood system, where they mingle with the current of the circulation and thus repair the bodily waste. And as a rule of the most universal character throughout the entire animal series, it may also be remembered that the digestive system of an animal feeding upon plants or vegetable food is longer and of more complicated nature than that of an animal feeding upon flesh. The contrast between the digestive systems of a grain-eating and a flesh-eating bird in this respect is seen to be very marked; and the contrast is equally well observed in the difference between the digestive system of the larval frog or tadpole and that of the carnivorous adult frog.

In mammalia broad variations in the form and complexity of the digestive systems are noticeable. In some the system is comparatively simple, whilst in others—as in some marsupials, but most notably in the case of the ruminants (sheep, oxen, &c.), or those that 'chew the cud'—the stomach evinces a highly complex nature. The structure of the ruminant digestive system will be noted under the head of Ruminant (q. v.) and Rumination (q. v.). Variations exist in the mammalian digestive organs chiefly in the relative length of the intestinal canal, in the nature and number of the teeth, in the development of the tongue and other appendages, and in the glands connected with the system.

Dig'it (Lat. *digitus*, 'the finger'), in arithmetic, the name given to each of the symbols, 0, 1, 2, 3, &c., to 9; in astronomy, the twelfth part of the diameter of the sun or moon. In anatomy the name is applied to the fingers and toes of the *Vertebrata*.

Digital'ine is the active principle of the common foxglove (*Digitalis purpurea*). It is colourless, crystalline, and sparingly soluble in water; dissolves more readily in alcohol and ether, and is very bitter and poisonous. Considerable doubt exists as to its true chemical composition. It belongs, however, to the class of bodies called Glucosides (q. v.), for when boiled with dilute acids it takes up water and splits into Glucose (q. v.) and other products. D. is a valuable medicine.

Digita'lis, a genus of plants of the natural order *Scrophulariaceæ*. They are biennials or perennials, with erect stems and large showy flowers in long one-sided racemes. They are natives chiefly of Europe and the N. of Asia. D. is often cultivated in gardens, especially the yellow *D. grandiflora*. Only one species is native in Britain—*D. purpurea*, the common purple foxglove. It grows from 2 to 4 feet high, with beautiful flowers spotted inside. It occurs in dry hilly places, roadsides, and plantations. It abounds in Western and Central Europe, and extends as far as Scandinavia. The *leaves* of *D. purpurea* are used in medicine. They are collected from wild plants in Britain when about two-thirds of the flowers are expanded. They are used as powder tincture and infusion. In large doses D. is an irritant poison, and in small doses it depresses the heart's action, and increases the flow of urine. It is a valuable medicine in certain kinds of heart-disease, and very specially in dropsies depending on heart-disease; but being cumulative in its action, it should be administered with great caution. Its active principle is Digitaline (q. v.).



Digitalis purpurea.

Digita'ria. See MILLET.

Digitigra'da ('toe-walkers'), the name applied to that section of the mammalian order of *Carnivora* of which the included members walk on the tips of their toes, the heel being raised from off the ground. Examples of such forms are found in the *Felidæ* (tigers, lions, cats), *Canidæ* (dogs, wolves, &c.), &c. Some forms (*e.g.*, *Mustelidæ* or weasels) are termed *semi-plantigrada*, since they apply only part of the sole to the ground in walking; whilst the bears are wholly *Plantigrade*, and apply the entire sole of the foot to the ground.

Digne, the capital of the department Basses-Alpes, in a wild mountain gorge on the left bank of the Bléone, 45 miles N.E. of

Nice. It is surrounded by walls flanked with towers, is the seat of a bishop (since 340), of a Communal college, and of a theological seminary, and has manufactures of woollens, colours, hosiery, &c., and an active trade in dried fruits, wine, honey, wax, and cutlery. In the vicinity is the beautiful Castle of Malijay, and the village *Les Mées* (pop. 2165), where a pleasant wine resembling champagne is made. Pop. (1872) 6877. D. is the Roman *Dinia* (probably from the Cymr. *din*, a fortified height; cognate with the Gael. *dun*), and was the capital of the Bodiontici, but has no antiquities. Napoleon issued at D. his proclamation of 4th March 1815.

Di'hong, the name of a part of the Dzangbo or Machang Sanpo, chief tributary of the Brahmaputra. It forms the portion between Thibet and the confluence with the great river in Assam. Some 15 miles E. is the Dibong, the lower part of the Kempu, another branch of the Brahmaputra.

Di'jon, the capital of the department Côte d'Or, France, in the valley of the Suzon, where it is joined by the Ouche, 195 miles S.E. of Paris by railway. It lies near the base of the vine-clad Mont-Affrique, at the N.E. end of the Cote d'Or range, and has gardens, promenades, and tree-shaded ramparts, which make it one of the finest towns of France. The chief buildings are the Cathedral of St Bénigne, rebuilt for the third time at the end of the 12th c., and having a graceful spire 300 feet high; the church of Nôtre Dame, pronounced by M. Viollet-le-Duc the finest Burgundian building of the 13th c.; that of St Michael, in which the external details are Grecian and the interior pure Gothic; the townhall, formerly the palace of the Dukes of Burgundy, and containing in its magnificent saloons a rare collection of scientific and art subjects, and a valuable library of 50,000 volumes. The seat of a celebrated academy and of various educational institutions, D. has also manufactures of woollen cloths, blankets, glue, mustard, beer, baskets, iron, saltpetre, &c., and a trade in grain, wine, oil, and wool to the value of seventy million francs yearly. Pop. (1872) 36,697. During the Roman invasion a village on the slope of Mont-Affrique was occupied by Cæsar as a camp, and fortified, receiving the name of *Dibio* or *Dibis-dunum* (Celt. 'the fort on the two waters'). It subsequently prospered, and in the middle ages became the capital of Burgundy. The Germans besieged D. on the 31st of October 1870, after which it capitulated, and was for a time the head-quarters of Werder. A struggle between Manteuffel and the armies of Bourbaki and Garibaldi took place in the vicinity, January 21–23, 1871.

Dik'owa, a town of the Soudan, in the kingdom of Bornu, 60 miles S. of Kuka, and 30 of Lake Tchad. It is the centre of a great cotton-field, and carries on extensive cotton manufactures. Pop. about 30,000.

Dilapida'tion, in English law, when an incumbent allows the parsonage or outhouses to decay, or pulls down any building, or destroys trees belonging to his benefice, he is subject to an action for D. at the instance of his successor. But an incumbent is not bound to maintain painting, papering, or other ornament. Under the Ecclesiastical Dilapidations Act, surveyors of D. are appointed for each diocese, who are to inspect buildings and report to the bishop. If the incumbent refuse or neglect to repair in accordance with the report, the bishop may sequestrate the revenues of the benefice for the purpose. When the works are executed, the incumbent is protected from further liability for five years. The Act provides for fire-insurance, &c.

Dil'atory Defence', a term of Scotch law for a plea for avoiding the conclusions of an action without entering on its merits, such as the pursuer's want of title.

Dilemm'a is in logic an argument presenting two or more alternatives, each of which is fatal to the opposite argument. Any position which presents a choice of evils is spoken of as a D. The popular equivalent is a *fix*.

Dilettan'te (Ital. pl. *dilettanti*, Lat. *diligentes* or the post-classical *dilectores*), a term used in England, France, and Germany to denote an amateur, primarily of music, but afterwards of the kindred arts. The name first meant 'a lover of art;' it was then applied to one who dabbled in art; and has lastly become a depreciatory term conveying the notion of a shallow critic or trifling virtuoso.

Dilettanti Society, The, was founded in 1734 by a gentleman who had travelled in Italy. It met at the Thatched House Tavern in St James's Street, at first merely for informal talk on the subject of art. In 1764, however, the society's funds having increased, its members, who were about sixty in number, sent out an expedition to Greece. The monuments of ancient times were examined, and the enterprise bore rich fruit in two volumes on the *Antiquities of Ionia*. A second expedition was despatched to Asia Minor in 1811, which resulted in two works, *The Unedited Antiquities of Attica* (1817) and *Antique Sculpture* (1835). This society, by its liberality and judiciousness, did much to elevate and correct the public taste.

Dil'igence, a term of Scotch law, used in three unconnected meanings:—1. In its ordinary sense, as indicating the care which the law requires every one to bestow on the subject of a contract. (See CRIME, CULPA, DOLE.) 2. It means the warrant of a court to enforce attendance of witnesses or production of writings. 3. The term is applied to the process of law by which persons, lands, or effects are attached in execution of Sentences and Decrees (q. v.), or in security of debt. In the second sense, the English general equivalent term is *Subpœna* (q. v.). See also, as applicable to this meaning, HAVER, INCIDENT DILIGENCE.

Diligence. In France a stage-coach is called *La D.* It has generally three divisions—the *coupé*, the *intérieur*, and the *rotonde* or *banquette*. In booking, a receipt should be taken. As with ourselves, the system of diligences has been almost superseded by that of railways. In Scotland, the word was, in former times, used to denote a stage-coach. Every one will remember the celebrated *Hawes Fly* or *Queensferry D.* of *The Antiquary*. In Spain, *La Diligentia*—the name one would suppose being satirically bestowed—still flourishes; but no one who dislikes dirt, vermin, and the smell of garlic should travel by D. in Spain.

Dilke, Charles Wentworth, a well-known English critic and journalist, was born 8th December 1789, served in the Navy Pay-Office, took to literature, contributed to the *Westminster Review*, &c., became (1830) editor and proprietor of the *Athenæum*, and established the *Daily News* in 1846. He edited *Old English Plays* (6 vols. Lond. 1814), wrote ably on Junius and other curious questions of literary history, and died at Alice Holt, Hampshire, 10th August 1864. See *The Papers of a Critic, Selected from the Writings of the late C. W. D., with a Biographical Sketch by his Grandson* (2 vols. Murray, 1875), containing original letters from Charles Lamb, Keats, Hood, Haydon, Lord Lytton, Dickens, Savage Landor, &c.—**Sir Charles Wentworth D.**, eldest son of the former, was born in London, 18th February 1810, studied at Westminster School and Cambridge, and was one of the active originators of the Industrial Exhibition of 1851. A member of the Society of Arts from 1844, he received a baronetcy in 1862. He died at St Petersburg, 11th May 1869.—His son, **Sir Charles Wentworth D.**, was born at Chelsea, September 4, 1843, graduated at Cambridge in 1866, and travelled round the world, giving his experiences in *Greater Britain, a Record of Travel in English-Speaking Countries* (2 vols. 1868), in which he traces the influence of race on government, and of climate upon race. D., who is a Radical in politics, was elected member of Parliament for Chelsea in 1868, and was re-elected in 1874.

Dill (*Anethum*), a genus of Umbelliferous plants. The common D. (*A. graveolens*), a common plant of the Cape of Good Hope, Egypt, the Mediterranean countries, &c., is aromatic, and used as a flavouring material for pickles, sauces, &c., while the seeds, or rather fruits, are used as a remedy for flatulence, and to alleviate the griping action of purgative medicines on infants, in the form of *D.-water*. Sowa D. (*A. Sowa*) of Bengal produces a fruit much used as an ingredient in curries. It is believed to be the 'anise seed' of the New Testament.

Dillenia'ceæ, a natural order of Dicotyledonous plants, allied to *Ranunculaceæ* (q. v.), natives principally of Australia, India, and equinoctial America. Above 230 species and 30 genera are known. Of these, *Dillenia*, *Candollea*, and *Tetracera* are examples. Most are astringent, and are used for applying to wounds, and, in Brazil, for tanning. The acid calyces of some species of *Dillenia* (*D. scabrella*, and *D. speciosa*), owing to their acid taste, form in India an ingredient in curries. The acid fruit of *D. speciosa* is eaten with sugar, and the juice mixed with water is in favour as a cooling drink in fevers. A decoction of

the leaves of *D. retusa* is employed in Ceylon for cleansing foul ulcers. The wood of some trees of the same genus (*D. pentagyna*, &c.) is also very hard and durable. Some species are also cultivated for the sake of their evergreen foliage and beautiful flowers.

Dilman', a town in the province of Azerbijan, Persia, 50 miles N.N.W. of Urumiyah, in the fertile plain of Selmas, and surrounded by gardens. The streets are clean, but the bazaars are ill supplied. Pop. about 15,000. Four miles distant from D. are the ruins of the old town of D.

Dilo'lo, Lake, in the interior of S. Africa, Muati Janvo's kingdom, 475 miles W. of Bangweolo, is an expansion of the Leeba, a branch of the Zambesi, and is 10 miles long, and has an extreme breadth of 4 miles. It was discovered by Livingstone in 1856. See his *Missionary Travels and Researches in South Africa* (new ed. Lond. 1875).

Dil'uents (from Lat. *diluo*, 'I wash away') are medicines which increase the watery portion of the blood, and render the secretions and excretions less acrid and viscid. The best diluent is water.

Dilu'vium (Lat. 'a washing away'), the name given in geology to such superficial accumulations of debris or matter as may have resulted from the wearing action of rivers, or been deposited on a land surface by the action of water. The muddy sediment left on land by the overflowing of a river is a *diluvial* deposit in this sense—the only one in which the term can be applied in modern geological science. Formerly the term *diluvial deposits* was given by the advocates of the 'diluvial' or 'flood' theory to collections of matter which they believed had been left by the flood of Noah—a flood credited by them with the power of having caused all recent events in the history of the world.

Dime' (Fr. originally *disme*, from Lat. *decima*, 'tenth'), the tenth part of an American dollar; but, as in the case of the French *décime* (of which the name is merely a doublet), used but little in commercial life.

Dimen'sion (Lat. *dimensio*, 'a measuring'), in geometry, a line is of one D., a surface of two—length and breadth—and a solid of three. Thus also space is of three dimensions, three numbers being necessary and sufficient to fix the position of a point in space. The *dimensions* of an algebraic expression is obtained by taking the algebraic sum of the indices of the factors which enter; thus $\frac{a^3bc^2}{d^4}$ or $a^3bc^2d^{-4}$ is of 2 (= 3 + 1 + 2 − 4), and $\frac{a}{b^2c}$ of − 2, dimensions.

Dimidia'tion (Lat. *dimidiatio*, 'a halving'), in heraldry, a mode of impalement in marshalling coats of arms, which was introduced as early as the beginning of the 14th c. It consists in cutting two shields by a vertical line through the fess-point, placing together the dexter half of the one and the sinister half of the other, and thus forming a new composition. But extraordinary effects were often produced by D., one of which is seen on the seal of the Cinque Ports—the sterns of the ships and the fore parts of the leopards showing unheard-of monsters. Impalement by complete coats of arms instead of halves has superseded D. in English heraldry.

Diminuen'do (in music). See DECRESCENDO.

Dimin'utives, words which convey the idea of diminution or of smallness compared with the meaning of the words whence they are derived. D. may be formed by adding a letter or letters, as *ie*, a diminutive termination now almost confined to Lowland Scotch, in *lassie, mousie, boatie*; or as *ock* in *hillock*; *kin* in *mannikin* and *lambkin* (comp. Ger. *chen*, as *mädchen*); *en* in *kitten*; *l* in *tiercel*, a small hawk, from *tierce*. The diminutive termination *ling*, as in *darling*, 'little dear,' was at first an Old English patronymic—thus in the Old English Bible Elihsa's son is *Elising* (Latham)—and from signifying relationship, came to denote endearment, youth, or littleness. The ending *et*, as in *trumpet*, is of classical origin, and in the ending *let*, the *l* is German, and the *t* either English, as in *gimlet*, or French, as in *ringlet*. D. may also be formed by changing a vowel, *e.g.*, *top, tip*. D. frequently convey the idea of endearment, but also of contempt, as in *hireling, witling, lordling*. Adjectives as well as nouns can become D., as *whitish, greenish*. In Latin, D. end always in *lus, la*, or *lum*. They are common in all languages, the modern German and Tuscan being especially rich in them.

Dim'ity, a cotton fabric used principally for bed-furniture, &c., said to owe its name from having been originally a manufacture of Damietta in Egypt.

Dimor'phism. Of late years, chiefly owing to the observations of Charles Darwin, it has been discovered that in several plants belonging to different orders two forms are found, the one form having long stamens and a short pistil, the other a long pistil and short stamens, and with different-sized pollen grains, but differing in no appreciable way. Such plants are called *Dimorphic*. The common primrose is an example. These two forms act towards each other almost exactly as if they were separate species, instead of merely forms of the same species, with no difference appreciable to the ordinary observer. In such a case, the pollen of the long-stamened form must be carried attached to the bodies of insects to fertilise the long pistilled form, and that of the short-stamened form to fertilise the short-pistilled form; otherwise it acts like so much inert dust. The object of this and similar arrangements for cross fertilisation seems to be to prevent too close interbreeding. See also FERTILISATION and TRIMORPHISM.

Dimor'phous Bodies are those which crystallise in two distinct forms—that is to say, in forms belonging to different crystalline systems. (See CRYSTALLOGRAPHY.) Sulphur furnishes an excellent instance of dimorphism. Native sulphur (*i.e.*, sulphur occurring in the free state in nature) is found in octohedral crystals belonging to the rhombic system, and where crystals can be obtained artificially by allowing a solution of sulphur in bisulphate of carbon to evaporate spontaneously. But if sulphur be fused, and then allowed to cool slowly, it crystallises in quite a different shape. This second modification of sulphur is easily obtained by fusing a few pounds of sulphur in a dish, allowing the fused mass to cool until a crust forms on its surface, and then perforating the crust with two holes, through one of which the sulphur still remaining fluid is poured away, whilst the other serves to admit air. When all the fluid portions have been poured off, the dish is broken, and it will then be found that its surface is covered with a cake of solid sulphur from which transparent amber-coloured needles jut out. These needles are oblique prisms. Carbonate of lime is another D. body. It occurs in nature as two distinct minerals, viz., *arragonite* and *calc spar* or *Iceland spar*. The crystals of arragonite are ortho-rhombic prisms; those of Iceland spar, rhombs.

Dinagepore', a town of British India, province of Bengal, capital of the district of the same name, 261 miles N. of Calcutta. Pop. (1872) 13,042. It is a poor place, the houses being for the most part mere huts.—The *district* of D. has (Administration Report of the Province for 1871–72) an area of 4126 sq. miles. Pop. 1,501,924.

Di'nan (from Cymr. *din*, 'a fortress'), a town in the department of Côtes-du-Nord, France, on the Rance, 14 miles S. of St Malo, on the summit of a steep hill, upwards of 200 feet above the river, and surrounded by high old walls. The older streets are narrow and filthy, and many of the houses are built of wood. The most noteworthy edifice is the Cathedral of St Sauveur, an ornate Gothic edifice with a fine spire. D. has manufactures of linen, cotton, and woollen goods, nails, beetroot sugar, &c., and some tanneries, salt-refineries, and barge-building yards. It has a good coasting and inland trade. In the neighbourhood are favourite chalybeate springs. Pop. (1872) 7089.

Dinant' (Cymr. 'the fort on the stream'), a town in the province of Namur, Belgium, on the Maas, 14 miles S. of Namur. The principal buildings are the citadel, occupying the summit of a lofty pyramidal limestone rock, the Church of Nôtre Dame, and the Hôtel de Ville, formerly the palace of the Princes of Liége. There are manufactures of hats, woollen stuffs, stained paper, cutlery, &c., besides tanneries, breweries, soap-works, salt-refineries, and mills for sawing marble. D. is famous for its gingerbread. The town, which dates from the 6th c., was strongly fortified as early as the 12th c. Pop. (1866) 7266.

Dinapore', a town and military station in British India, province of Behar, district of Patna, on the right bank of the

Ganges, about 12 miles N.W. of Patna. Pop. of D. Nizamut (1872), 27,914; pop. of cantonment, 14,170. In the mutiny of 1857 three native regiments here rose against their officers, and in spite of the presence of a European force, were allowed to withdraw from the cantonment with comparative impunity.

Dinar'ic Alps, the easterly range of the Central European system, extending along the Adriatic coast. It forms a southern continuation of the Julian Alps, and separates Turkey from the Austrian coast-lands. It is some 230 miles long from Fiume to the river Narenta, and has few heights of more than 7000 feet.

Dindigal', a town in British India, province of Madras, district of Madura, 247 miles S.W. of the city of Madras. It is neatly built, and the bazaar, which is well supplied, is lined with trees on both sides. The fort, on a rocky elevation 280 feet high, is supplied with water from a well on the rock of enormous depth. Pop. between 6000 and 7000.

Ding'elstedt, Franz von, a German poet and novelist, born 30th June 1814, at Halsdorf near Marburg, studied at Marburg, and was for some time teacher in the Gymnasium at Fulda. In 1843 he was appointed librarian and reader to the King of Würtemberg, in 1850 manager of the Court Theatre at Munich, in 1857 general superintendent of the same at Weimar, in 1867 director of the Court Opera at Vienna, and in 1871 of the City Theatre there. D.'s chief works are *Lieder eines Kosmopolit. Nachtwächters* (1840), *Gedichte* (2d ed. 1858), *Nacht und Morgen*, *Neue Zeitgedichte* (1851), the novels *Heptameron* (2 vols. 1841), *Unter den Erde* (1840), *Novellenbuch* (1850), *Die Amazone* (1808), the tragedy *Das Haus des Barneveldt* (1850), *Studien und Kopien nach Shakespeare* (1857), and translations of several plays of the great English dramatist. Delicacy of sentiment, pictorial beauty, and epigrammatic terseness of reflection are D.'s most conspicuous merits.

Din'gle (Gael. *Daingean-ui-Chuis*, 'the fort of O'Cush,' the ancient family of proprietors before the English), the most westerly town in Ireland, a seaport and favourite sea-bathing place, county of Kerry, on the N. side of the bay of the same name, 39 miles W.N.W. of Killarney. The harbour admits vessels of 300 tons. Some of the older houses are built in the Spanish style, which gives the town a pleasantly antique appearance. D. exports corn and butter to Liverpool, and imports iron, coal, salt, and earthenware. Pop. (1871) 2117.

Din'go, in natural history, a species of dog indigenous to Australia. In appearance and disposition it much resembles the wolf. Its average height is a little less than 2 feet, and its average length 2½ feet. Its general colour is a reddish brown. The tail is bushy, like that of a fox, though in a less degree. The D. is a ferocious animal, and works havoc among the flocks of the colonists, delighting in killing as many sheep as it can. It does not bark or growl, like other dogs, but erects its hair-like bristles when angry. It is capable of domestication, but being less trustworthy than the shepherd's dog, it is generally treated as a foe, and exterminated as fast as possible.



Dingo.

Ding'wall (Scand. 'hill of justice;' Gael. *Inverpeffer*, 'at the mouth of the Peffer'), a royal burgh and the capital of Ross-shire, Scotland, lies at the head of the Cromarty Frith, 18 miles S.W. of its mouth in the Moray Frith, and 17 N.W. of Inverness by railway. It has an antique appearance, is approachable to vessels of 9 feet draught, and has some export trade in wool and cattle. Along with Tain, Dornoch, Wick, Kirkwall, and Cromarty, it returns one member to Parliament. Pop. (1871) 2125. The chief objects of historical interest are the traces of an old castle of the Ross family, and a conical hill supporting a vitrified fort, probably the 'hill of justice' from which D. originally took name. In the vicinity the village of Strathpeffer, nestling in a sheltered and picturesque valley, attracts large numbers of invalids to its chalybeate and sulphurous springs.

Din'ka, a pastoral people of Central Africa, in the Upper Nile district, to the S. of the confluence of the Bahr-el-Ghazal and the White Nile, and occupying an area of from 60,000 to 70,000 sq. miles. They are one of the most extensive and unique of African races, peculiar alike for their cleanliness, their civilised tastes and pursuits, and their ferocity in war. Very dark in colour, they are taller than Englishmen, and have thick lips, contorted features, and shallow foreheads. Their hair is cut short, and is adorned with ostrich feathers, in imitation of the heron. No covering is worn except by the women, who are scrupulously clad, and who wear heavy iron rings on their wrists and ankles. Both sexes break off the lower incisors, a practice that renders their language inarticulate. The dwellings of the D. are conical, well-built huts, and are scattered in clusters over the cultivated plains. Nearly the whole of their vast territory is a steppe of dark alluvial clay, unbroken by a single hill, mass of rock, or large tract of forest. Of the cultivated plants the chief are sorghum, penicillaria, beans, earth-nuts (*archis*), earth-peas, sesame, yams, and Virginian tobacco. The domestic animals are the ox (of the zebu race), the sheep, goat, and dog. A village of a few huts has seldom less than 2000, and sometimes as many as 10,000 cattle. An estimate of the total number of cattle gives three for each inhabitant. The ox, which is never killed, is the object of exclusive, almost religious care. Whatever of religion the D. has, centres in an institution called the Cogyoor, which embraces a society of necromancers and jugglers. There is much tribal disturbance. Since about 1855 the various efforts of the Khartum slave-dealers to subdue the Dinkas have completely failed, and it is even at some risk that parties venture through their territory to reach Bongo, Niam-Niam, Mittu, &c. All the early captives taken to Egypt were converted into soldiers, and still form a conspicuous element in the ranks. See Dr Schweinfurth's *Heart of Africa* (2 vols. Lond. 1873).

Dink'elsbühl, one of the oldest towns in the circle of Middle Franconia, kingdom of Bavaria, on the Wernitz, 20 miles S.W. of Ansbach, has large manufactures of hosiery, paperhangings, &c. It is defended by walls and towers, and has a large Catholic church and a handsome Protestant one. Fortified under Heinrich I., and created a free city of the empire in 1351, D. was greatly reduced during the Thirty Years' War, and has since suffered much from religious dissensions. Pop. (1872) 5212.

Din'mont, the name given in Scotland to a wether or gelded hogg after its first fleece has been cut.

Dinor'nis (from the Gr. *deinos*, 'terrible,' and *ornis*, a 'bird'), in natural history, the name of a genus of extinct wingless birds of great size whose remains are abundantly found in New Zealand. The D. was first brought under the notice of the scientific world by a paper read by Professor Owen in 1839 on the fragment of a shaft of a femur, 6 inches long. From this fragment Professor Owen deduced the former existence in New Zealand of a large bird combining some of the leading characteristics of the ostrich and the dodo, and subsequent discoveries have proved the general accuracy of his deductions. The D. is generally known in New Zealand, alike to the Maoris and the colonists, under the name of the Moa. Scientific examination of the bones discovered in different parts of the colony has resulted in the establishment of several distinct species. The largest of these, *D. giganteus*, must have been from 10 to 11 feet high; while *D. didyformis* attained a height of 4 feet only. The leg-bones of the D. are of an exceedingly massive description, and the toes of *D. elephantopes* rival in this respect those of the elephant, whence its name. Deposits of D. bones have been found in many parts of New Zealand, but especially in the provinces of Otago and Canterbury. The most remarkable discoveries of this nature have been made in the Dunstan district of Otago and the Glenmark district of Canterbury. In caves in the former locality there has been found a neck with the skin and some of the feathers attached, as well as a thigh-bone with a large piece of the flesh adhering to it. In the same neighbourhood were also found, 50 feet below the surface, some D. feathers in an excellent state of preservation. They were of a chestnut-brown for the basal two-thirds, shading off into black, with white tips. A vexed controversy has arisen among naturalists as to the probable date of the extinction of the D. On the one hand, it is claimed that the freshness and situation of the remains prove that the D. has not been extinct for more than a century; and on the other, that it was exterminated by a race of *autochthones*, prior to the arrival in New Zealand, 500 years ago, of the Maoris, who have no legends regarding it. That the D. was

hunted and eaten by a savage race is proved by the discovery of bones and eggshells, some of them charred, in old native cooking places, along with stone implements. Being a slow, ungainly bird, unable to fly, its means of escaping pursuit were small. The remains of a large species of D. have been found in the Leichhardt Downs, Queensland, 86 feet below the surface. Further particulars regarding the D. remains discovered in New Zealand will be found in the *Transactions of the New Zealand Institute*, vols. iv. and v.

Dinosau'ria, or **Deinosauria** (Gr. 'terrible lizards'), an order of extinct Reptiles, distinguished by the variable nature of the skin-scales, by possessing teeth, by the development of two pairs of limbs adapted for walking, and by the absence of clavicles or 'collar-bones.' The pelvis approaches very nearly in its character to that of Cursorial or Running Birds. The order is represented by such forms as *Megalosaurus*, *Compsognathus* (q. v.), and *Iguanodon* (q. v.), the remains of which occur in Oolitic and Cretaceous strata.

Dinother'ium, or **Deinotherium** (Gr. 'terrible beast'), an extinct genus of *Proboscidea* or elephant-like mammalia, the fossil remains of which occur in Miocene formations of Europe and of India. *D. giganteum* is a familiar species. In the D., molar and præmolar teeth are developed, the upper jaw possessing no incisor or canine teeth. The lower jaw possessed two large tusks formed by the lower incisor teeth, these tusks being bent *downwards* and backwards, instead of upwards as in living elephants. These animals must have attained a very large size, and probably used their tusks for grubbing up the roots of the aquatic plants upon which they fed.

Di'ocesan Courts. See CONSISTORY and COMMISSARY.

Di'ocese (Fr. from Gr. *dioikēsis*, 'administration') is the territory of a bishop's ecclesiastical jurisdiction. England is divided ecclesiastically into two provinces—Canterbury and York—each of which is subdivided into dioceses; each D. is subdivided into archdeaconries, and each archdeaconry into parishes. Formerly there were in Scotland the Archbishop of St Andrews, entitled *The Primate of all Scotland*, and the Archbishop of Glasgow, entitled *The Primate of Scotland*. Under them were twelve bishops, who each had a D. Scotland is now ecclesiastically divided into presbyteries. See PRESBYTERY.

Diocletia'nus, Vale'rius, was born near Salona, in Dalmatia, 245 A.D. He was of humble origin, but having entered the army, he served with distinction, and rose to high command under Probus, Aurelian, and Carus. In 284, after the murder of Numerianus, the troops assembled at Chalcedon and unanimously invested D. with the supreme power. His first act was to slay with his own hands Aper, captain of the guard, who was believed by the soldiers to be guilty of the late Emperor's death. The death of Carinus, the surviving colleague of Numerianus, in the hour of victory, and by the hands of his own officers, left D. undisputed master of the situation, and he used his victory with singular moderation. His reign is remarkable for the changes effected by him on the form and constitution of the sovereignty, and by the substitution of the dress, manners, and court style of Persia for those of Rome, revolutions which were intended to provide for the defence of the empire and for the security of the Emperor. In 286 D. assumed as colleague Maximianus Herculius; and, since the dangers that threatened the Roman dominions were increasing alike in Europe, Asia, and Africa, a further partition of authority was made. In 292 the two Augusti, D. and Maximianus, assumed as subordinate colleagues, under the title of Cæsars, Constantius Chlorus and Galerius. The empire was divided among the four potentates, and their efforts to re-establish it were crowned with success. Maximianus routed the Mauretanians, Constantius secured Britain, D. subdued Egypt, and Galerius triumphed in the East. These splendid victories were celebrated at Rome in the twentieth year of the reign of D. by a magnificent triumph, which was memorable as being the last ever witnessed in that city. In 305 D., now exhausted by anxiety and toil, abdicated the throne, and after eight years' retirement near Salona, died in 313. In 303 D. stained his name by authorizing the last and fiercest of the ten great persecutions inflicted on the Christians by the Roman Emperors. See Mason's *Persecution of D.* (Lond. 1876).

Dioda'ti, Giovanni, a Calvinistic theologian, was born probably at Lucca, 6th June 1576. While D. was still a child, his family emigrated to Geneva on account of their Protestant opinions. Such was his precocity, that at the age of twenty-one he was appointed a Professor of Hebrew. Distinguished as a staunch reformer and an eloquent preacher, he became, in 1608, a pastor of the Reformed Church, and in 1609 a Professor of Theology. He played an important part in drawing up the articles of the Synod of Dort, where he represented the Genevan Church. He died at Geneva in 1649. D., who was the author of several theological works, translated the Bible into Italian (1607) and into French (1614).—His nephew, **Charles D.** (died 1638), was a schoolfellow and beloved friend of John Milton, who lamented his untimely death in one of his most exquisite poems, the *Epitaphium Damonis*. See Masson's *Milton* (vol. i.).

Di'odon, a genus of *Teleostean* (q. v.) fishes, belonging to the group *Plectognathi* (q. v.), and including forms popularly known as Globe-Fishes, Sea-Porcupines, and the like. They belong to the division of *Gymnodont* ('naked-toothed') fishes, a name applied to them from the projecting nature of the jaws, which appear in the front of the mouth, covered with shining ivory. The name D. itself ('double-toothed') is, in fact, derived from the apparently tooth-like form of the jaws. The nearly-allied genus *Tetraodon* (q. v.) has the jaws divided, so as to present the appearance of four teeth. Of the diodons, the *D. pilosus*, or hairy urchin-fish, and the *D. hystrix*, are familiar species. These fishes possess the power of inflating their bodies with air to a considerable extent; and their appearance when distended, together with the formidable array of spines with which their skin is provided, is very curious and imposing. This power of inflation serves apparently as a means of defence. The *D. hystrix* may attain the length of 12 or 14 inches, and with neighbouring species occurs chiefly in warm seas.

Diodo'rus, Sic'ulus, born at Agrium, in Sicily, was a contemporary of Cæsar and Augustus. He was the author of a universal history from the earliest times down to Julius Cæsar's Gallic wars, and in the preparation of this work he spent thirty years. It consisted of forty books, of which fifteen alone are extant, viz., books i.-v. and xi.-xx. It was called by the author the *Bibliotheca*, or *Library*, and was written in a lucid style; but its confusion and contradictions are so great as to deprive it of nearly all historical value. The best modern edition is that of Dindorf (Leips. 6 vols. 1828–31).

Diœ'cious (lit. 'two habitations') is a term used in botany to express the fact of a plant having the flowers containing the stamens on one individual of the species, while those with the pistil are on another. Willows are common examples, hemp and the date-palm are less familiar. *Diæciously-hermaphrodite* plants are those in which the flowers are Hermaphrodite (q. v.), but yet in none of which both the stamens and pistils are perfect. In one flower the stamens may be perfect and the pistils imperfect, and *vice versa*.

Diog'enes the Cynic, born at Sinope, in Pontus, about B.C. 412, went early in life to Athens, where he became one of the few pupils of Antisthenes, the founder of the sect of the Cynics. The youth of D. had been spent in dissolute indulgence, but his character now changed, and he became emphatically an austere man, wearing coarse clothes, living on plain food, sleeping on the bare ground, and, finally, if the common story be true (although probably it is not), residing in a tub. At Athens D. was noted for his free and pungent raillery, and for his indiscriminate ridicule of all engaged in the pursuit of literature, art, or science. A ship in which he was sailing to Ægina was taken by pirates, and D. was carried to Crete, where he was sold to Xeniades of Corinth, whose 'ruler' he speedily became, and with whom he resided till his death, at the age of ninety, B.C. 323. In a well-known interview with Alexander the Great, which commenced by the king's announcing, 'I am Alexander the Great,' D. replied, 'And I am Diogenes the Cynic.' To the king's further inquiry whether he could serve him in any way, D. answered, 'Yes; you can stand out of the sunshine.' Alexander is reported to have said: 'If I were not Alexander, I should wish to be Diogenes.' The philosophy of D. inculcated the abnegation, so far as practicable, of all sensual gratifications.

Diogenes Laer'tius, a philosopher of Laërte in Cilicia, whence his surname, wrote a *History of the Greek Philosophers* in ten books. The work is valuable for the information, anecdotes, and quotations which it contains, but is utterly destitute of plan,

precision, and critical ability. The period of D. is uncertain, being by some assigned to the 2d, by others to the 3d c. after Christ. The first complete edition of the *Lives* is that of Basel (4to, 1533); the best modern edition is that by Hübner (2 vols. 8vo, Leips. 1828-31).

Di'omede Islands, three in number (Fairway, Crusenstern, and Katamanow), are situated in Behring's Strait, between East Cape and Cape Prince of Wales, and form, as it were, the fragmentary links of a chain which had once connected the continents of America and Asia. They are uninhabited and of small size.

Diome'des, in Greek legend, the son of Tydeus and Deïpyle, and successor of Adrastus in the kingdom of Argos, was one of the *Epigoni* who took Thebes. In the Trojan war he distinguished himself beyond all the Greeks except Achilles. He went to Troy with eighty ships, and under the protection of Athene exhibited matchless prowess, vanquishing in single combat Hector and Æneas, and wounding even Venus and Mars. With Ulysses he took the Palladium from Troy, slew Rhesus, and bore away his steeds. At the funeral games of Patroclus he won the chariot race, and overcame the Telemonian Ajax with the spear. On the conclusion of the war he returned to Argos, only to learn that his wife Ægialeia had been unfaithful in his absence. In wrath and disgust he went to Ætolia, but again setting out for Argos, was driven by a storm to Daunia in Italy. He there married Euippe, daughter of Daunus, assisted the Trojans against Turnus, and founded a number of cities. He died at an advanced age—some say by the hand of Daunus—and was buried in one of the islands off Cape Garganus.

Dionæ'a. In the Southern States of America, and more particularly about Wilmington, in S. Carolina, is found the most remarkable *D. muscipula*—familiarly known as Venus' fly-trap. Every leaf bears at its summit an appendage which is probably the true blade, while what seems the leaf is only an expanded winged petiole. A mid rib divides this appendage into two equal parts, on the upper surface of which are three or four hairs, and along their margins are also rows of long closely set hairs and bristles. On an insect alighting on the blade so as to touch the hairs, the two sides close so as to crush the insect to death, while at the same time a fluid is exuded. The recent researches of Mr Darwin and others leave little doubt that this fluid acts as a digester, and that the substance of the fly or other animal matter is absorbed into the substance of the plant, and in some way assists in its nutrition. Not less remarkable is the fact discovered by Dr Burdon-Sanderson, that this closing of the leaf of D. is accompanied with electrical phenomena, analogous in their nature with those which occur when nervous or muscular actions are induced in animals. See Darwin on *Carnivorous Plants* (1875); Tate, *Proc. of Nat. Hist. Sect. of Midland Institute* (1875); Thos. Balfour, *Trans. Bot. Soc. Edin.* (1875).

Di'on Cass'ius Cocceia'nus, a celebrated Greek writer and historian, was born at Nicæa, in Bithynia, 155 A.D. After his father's death (180 A.D.) he repaired to Rome, and under a succession of emperors attained the highest official positions. His greatest work is a *History of Rome* from the time of Æneas to that of Alexander Severus, in eighty books, of which only eighteen (36th-54th) with fragments of others are extant. Of some of the books there are abridgments by Xiphilinus and others. D. spent ten years in collecting materials for this work, and twelve more in its composition. In critical acumen, grasp, and vigour, he is far behind Thucydides, whom he took as his model; but his history is exhaustive, honest, and notwithstanding a rhetorical tinge and peculiarities of style and language, eminently valuable. Besides his history, D. wrote a book on *Dreams and Prodigies*, now lost. He died at his native Nicæa. The date of his decease is not known. The best edition of his works is that of Sturz (Leips. 1824-43).

Di'on Chrysos'tomus ('the Golden-Mouthed'), also called *Cocceianus*, a surname derived from the Emperor Cocceius Nerva, whose favour and friendship he enjoyed, was born at Prusa, in Bithynia, about the middle of the 1st c. after Christ. He improved an excellent education by foreign travel. Though confining himself to no particular sect or school, he had a preference for the Stoic and Platonic systems. Being looked on with suspicion at home, he went to Rome, from which, on account of Domitian's hatred, he was compelled to flee. After visiting Thrace, Mysia, Scythia, &c., he returned on the murder of Domitian, 96 A.D., and was honourably received by Nerva, of whose claims to the purple he was an enthusiastic advocate. Trajan, Nerva's successor, esteemed him so highly that he allowed him to ride with him in his golden chariot. D. died at Rome, 117 A.D. As a man he was beloved and esteemed, and as an orator universally admired. Of his works, eighty complete orations, and fragments of fifteen, on a vast variety of subjects, remain to attest his eminence as a rhetorician and as a writer of pure Attic Greek. His chaste style and brilliant oratorical powers won the golden opinion of Niebuhr. The critical edition of his works by Reiske (2 vols. 8vo, Leips. 1784) is still considered the best.

Dionys'ius the Areop'agite was a member of the Areopagus at Athens, who, according to Acts xvii., was converted by the Apostle Paul, which is all that is said of him in the New Testament. The historian Eusebius relates that Dionysius, Bishop of Corinth, wrote an epistle to the Athenians, in which he mentions D. the A., St Paul's convert, as the first Bishop of Athens. He is chiefly famous on account of certain writings, probably belonging to the end of the 5th c., which were forged under his name, and first appeared in the Monothelite controversy, about 523. The object of the writer, who has been called the father of mysticism in the Christian Church, was to show that the real doctrines of Christianity were identical with those of his own philosophy—Neo-Platonism; the substance of his system being that the universe is an efflux of the life of God. The writings, the titles of which are *The Celestial Hierarchy, The Terrestrial Hierarchy, Mystical Theology*, and *Twelve Epistles*, had an unbounded influence in the Greek Church from the first; and when translated into Latin by Scotus Erigena, helped greatly to develop the tendency to Pantheistic mysticism which afterwards prevailed in the Western Church. See Neander's *Kirchengeschichte*, and Hodge's *Systematic Theology*.

Dionysius the Elder, tyrant of Syracuse, was born in 431 or 430 B.C. He commenced life as a clerk in a public office, but early took part in the political affairs of Syracuse. In 406 he secured the deposition of the commanders who had failed in the conduct of the Carthaginian War, and was himself one of those appointed in their stead. He next succeeded in obtaining by intrigue the removal of his colleagues, and became general autocrator in 405. D. confirmed his power by ingratiating himself both with the troops and with the populace, subdued partly by firmness and partly by good fortune several revolts against his authority, and successfully attacked the Chalcidian cities of Sicily. In 397, after extensive preparations, he declared war against Carthage. In the first campaign he encountered no opposition, and took Motya, an important stronghold, but in the following year Himilco, with a great armament, totally defeated the Syracusan fleet, and compelled D. to shut himself up within the walls of Syracuse. A pestilence, however, broke out among the Carthaginians, and D. was thus enabled to attack them suddenly and successfully. The Carthaginians renewed the war in 393 and 392, but on both occasions were defeated by D., and peace was then concluded. Through his allies, the Locrians, D. obtained extensive influence throughout the S. of Italy, and during the remaining twenty years of his tyranny he embraced every opportunity of maintaining and increasing his power. He died in 367. Strange as it may seem in the case of so vigorous and unscrupulous a tyrant, D. devoted himself assiduously to poetry, and one of his dramas carried off the first prize at Athens. He also courted the society of men distinguished in literature and philosophy.

Dionysius the Younger, tyrant of Syracuse, was the son of the preceding, by Doris of Locri, and at the age of thirty succeeded his father, B.C. 367. D. had never been permitted to take part in public affairs, and being encouraged in vicious excesses by Philistus the historian, became unpopular with the Syracusans, whom he further alienated by the banishment of Dion. On the return of Dion, the Syracusans revolted against D., who repaired to Locri, which he ruled with the utmost cruelty for several years. He recovered Syracuse by treachery ten years after his expulsion, but was compelled to yield to Timoleon in 343. He spent the remainder of his life at Corinth in degradation and destitution.

Dionysius of Halicarnassus flourished in the 1st c. B.C., his death having occurred soon after B.C. 7. He went to Italy

B.C. 29, and spent twenty-two years at Rome in studying the Latin language and literature. His rhetorical and critical treatises—such as his *Ars Rhetorica* and his criticisms on the Greek orators—are of great value. His chief work is his *Archæologia*, or Roman history, in twenty books, of which only the first nine have reached us complete. This work contained the history of Rome from the earliest times to the year B.C. 264, and discussed fully all that relates to the Roman constitution, religion, history, and antiquities.

Dionysius Thrax, or the Thracian, was a celebrated Greek grammarian, who taught at Rome about B.C. 80. He is remembered for the merit of his grammatical works, and for his explanations and criticism of Homer. His grammatical treatise was used in schools for many centuries.

Dionysius, surnamed **Periege'tes**, from his being the author of a *periēgēsis* (Gr. 'geographical description of the earth') in Greek hexameters, was a native of Africa, and lived probably in the latter part of the 3d or beginning of the 4th c. His work, which is still extant, is written tersely, and was translated into Latin by Rufus Festus Avienus, and also by the grammarian Priscian. There still exist a commentary upon it by Eustathius, and a Greek paraphrase and Scholia. The *editio princeps* appeared at Ferrara in 1512, with a Latin translation. It was also printed at Venice by A. Manutius in 1513, but the best edition is that of G. Bernhardy (Leips. 1828).

Diony'sos. See BACCHUS.

Diophan'tine Anal'ysis, a branch of algebra which treats of the solution of undeterminate questions, such as: To find three commensurable numbers whose squares are in arithmetical progression. The name is derived from Diophantus (q. v.), who solved a great many questions of this kind.

Diophan'tus, a Greek algebraist, who flourished at Alexandria probably about the 4th or 5th c. of the Christian era. Montucla, after Abulpharagius, places him at 365 A.D.; but the date is of little consequence except with reference to the question whether he obtained his algebra from the Hindus, or is to be regarded as the sole inventor of his methods. From an epitaph in Greek verse, discovered by Bachet, we gather that he married when thirty-three years old, that his son, born five years after the marriage, died at the age of forty-two, four years before himself, and that D. therefore lived eighty-four years. The information is given in the form of an algebraic problem. Of the thirteen books of his *Arithmetica*, only six are extant. There is also one other book, *De Multangulis Numeris*. The first printed edition was in Latin, by Xylander (Basel, 1575); Bachet de Meziriac published the original Greek, with Latin version and valuable notes (Paris, 1621); but the best is by Fermat (Toulouse, 1670). Miss Abigail Baruch Lousada left a complete English translation, which has unfortunately never been published.

Diop'sis, or **Stalk-Eyed Fly**, a genus of Diptera (q. v.) or Flies, belonging to the family *Muscidæ*, and distinguished by the elongation of the sides of the head to form stalks for the eyes. *Diopsis thoracicus* is a familar species of this group, the representatives of which mostly occur in warm climates.

Diop'trics. See OPTICS.

Diora'ma. See PANORAMA.

Dioscorea'ceæ, the Yam order, a natural order of Monocotyledonous plants, belonging to Lindley's sub-class *Dictyogenæ*, chiefly tropical plants. *Tamus communis*, the Black Bryony (q. v.), is the only British representative. There are about 160 species and seven genera. *Tamus*, *Testudinaria*, and *Dioscorea* are examples. The Yams (q. v.) are among the most important plants of the order. The Elephant's Food (q. v.) is another.

Dioscor'ides, the author of thirty-nine epigrams in the Greek Anthology, is thought to have lived in Egypt in the time of Ptolemy Euergetes. His epigrams, chiefly on the ancient poets, were included in Meleager's *Garland*.

Dioscorides, the name of several physicians and medical writers of antiquity.—1. **D. Pedacius** or **Pedanius** of Anazarba, in Cilicia, flourished in the 1st or 2d c. He wrote a treatise on *Materia Medica*, a work of immense research, and for many ages a standard authority, also a treatise on *Poisons* and another on *Venomous Animals*. Some minor works have been ascribed to him, but on insufficient grounds. His *De Materia Medica* has been translated into Italian, French, German, and Spanish, and an Arabian version of it in MS. is to be found in several European libraries. The first Greek edition was published by Aldus Manutius (fol. Ven. 1499). The best edition is still that of Saracenus (Frankf. 1598); the most recent that of Sprengel (Leips. 1829-30).—2. **D. Phacas**, so called from the moles or freckles on his face, lived in the 2d or 1st c. B.C. His medical works, of which several are mentioned by ancient writers, have perished.—3. A grammarian and probably a physican at Rome in the time of Hadrian, who devoted his attention to medical literature, and edited an edition of the works of Hippocrates.

Dip and Strike are terms used in geology. The 'dip' is the downward inclination of beds with reference to the horizontal plane, and requires for its determination two numbers—viz., the inclination of the beds to the horizontal, and the point of the compass towards which they slope. The 'strike' is the line drawn at right angles to the dip, corresponding to the outcrop when the surface is level.

Diphthe'ria (from Gr. *diphthera*, any leathery material), the name given to a contagious and epidemic disease of great severity, affecting chiefly the throat and neighbouring parts. It is essentially a blood disease, characterised by the formation of a false membrane on the back part of the mouth and throat. D. generally commences with headache, sickness, often diarrhœa and chilliness, and is soon followed by great prostration and the formation of dirty whitish patches on the back of the mouth, at first small, but soon coalescing so as to form a membrane whose appearance has been compared to that of 'damp, dirty, washed leather.' When this membrane begins to peel off there is a most offensive odour in the breath, and frequently the patient is unable to swallow. D. is a very fatal disease, and generally in a short time. The treatment consists in supporting the patient's strength, giving iron tonics internally, and applying Condy's fluid, or other disinfectant to the throat. Recovery is often followed by paralysis of some of the muscles. The patient should be kept warm in bed, and the air in the room should be hot and moist.

Diph'thong (Gr. *di*, 'twice,' and *phthongos*, 'a sound') is the blending of two vowel sounds into one syllable, *e.g.*, *ou* in 'house,' *ai* in 'aisle,' and *oi* in 'oil.' The distinction sometimes made between a D. to the eye and a D. to the ear is incorrect. There can be no D. which is not a D. to the ear.

Diph'yes, a beautiful genus of oceanic *Hydrozoa* (q. v.), or Zoophytes, belonging to the order *Calycophoridæ*, and consisting of a delicate thread-like *cœnosarc* or connecting medium, bearing the various polypites, or individual animals of which this compound organism is composed. At its proximal end the cœnosarc expands to form two mitre-shaped *Nectocalyces*, or 'swimming-bells,' by means of which the organism is supported in the water. Each of the polypites is protected by a glassy 'bract,' or hydrophyllium. *D. appendiculata* is a familiar species of this genus of *Calycophoridæ*, and occurs in the Mediterranean and warm seas.

Diplacan'thus, a genus of extinct Ganoid fishes, of which *D. gracilis* is a familiar example. This genus belongs to the family *Acanthodidæ*, the members of which possessed small scales, and a spine implanted in the flesh in front of each fin. No operculum was developed. D. had two dorsal fins, and is confined solely to Devonian rocks. The tail was heterocercal.

Dip'loe, the cellular bony structure between the two plates or tables forming the flat bones of the skull. These cells are filled with a reddish pulpy substance, similar, when examined microscopically, to the marrow of bones.

Diplogloss'us, a genus of *Lacertilia*, or Lizards, found in Cuba. The colour of the best-known species (*D. sagræ*) is grey with bronze tints, whilst a black streak marks each side. The D. is an active little creature, and inhabits dry localities.

Diplograp'sus, a genus of *Graptolites* (q. v.), an extinct group of Hydrozoa (q. v.) or Zoophytes. This genus, of which *D. pristis* is a familiar species, ranges in Britain and N. America from the Upper Cambrian strata to the upper strata of the Lower Silurian rocks; but in Bohemia, D. occurs in Upper Silurian rocks also.

Diplo'ma (Gr. *diploō*, 'I double or fold') is the writing given by universities and other learned bodies in proof of the person

named in it having been granted a degree or licence for professional practice.

Diplom'acy is the art of managing international affairs by means of ambassadors and other officers accredited by one state to another. (See AMBASSADOR.) A diplomatist requires to be a man of great tact and good temper, ready in all social ceremonial to conform to the manners and customs of the people among whom he is resident. Infinite tact is required in matters involving questions of precedence. Precedence is conceded to crowned heads, and a head crowned is held to maintain its dignity under all reverses. In making a treaty, the usual practice is to make as many copies as there are parties to it. Each state gets a copy with precedence to its own name. In other matters the precedence of the various powers of Europe and of the United States of America, from time to time, is by what is called the *Alternat*, which is determined by lot. Maritime international ceremonial is arranged by compact. See SALUTE.

Diplomat'ics is the art of reading ancient writings, combined with scientific knowledge of their circumstances. The term has been superseded by the more descriptive one of Palæography (q. v.).

Diplop'terus, a genus of fossil Ganoid (q. v.) fishes, included in the group *Crossopterygidæ*. This form, which has representatives in the Devonian and Carboniferous rocks, had two dorsal fins, rhomboidal and smooth scales, and lobate fins. Like all *Crossopterygidæ* ('fringe-finned'), the species of D. had the paired fins each in the form of a central lobe covered with scales, and having the fin-rays attached to its sides.

Dip'noi, an important order of the class of fishes represented by the *Lepidosirens* (q. v.), or Mud-Fishes of Africa and S. America, and by the *Ceratodus* or *Barramunda* (q. v.) of Australian rivers. Probably Dr Günther's idea that the D. should be viewed as a subdivision of the Ganoid fishes is correct and trustworthy. As a distinct order, the D. are recognised by possessing fish-like bodies; the skull has distinct cranial bones and a lower jaw, but the spine is represented by a *notochord* (q. v.), and no bony spinal elements exist. Small *cycloid* scales cover the body. The pectoral and ventral fins (in *Lepidosiren*) are filamentous in character, and in *Ceratodus* consist each of a central rod with lateral branches. The tail-fin is median and vertical. The heart is three-chambered. The breathing is conducted by gills and also by rudimentary lungs, formed by the modified 'Air-Bladder' (q. v.). The nostrils open posteriorly into the throat. In respect of the last three characters, these fishes differ from all others. *Lepidosiren* is said to have external gills like amphibians in its young state.

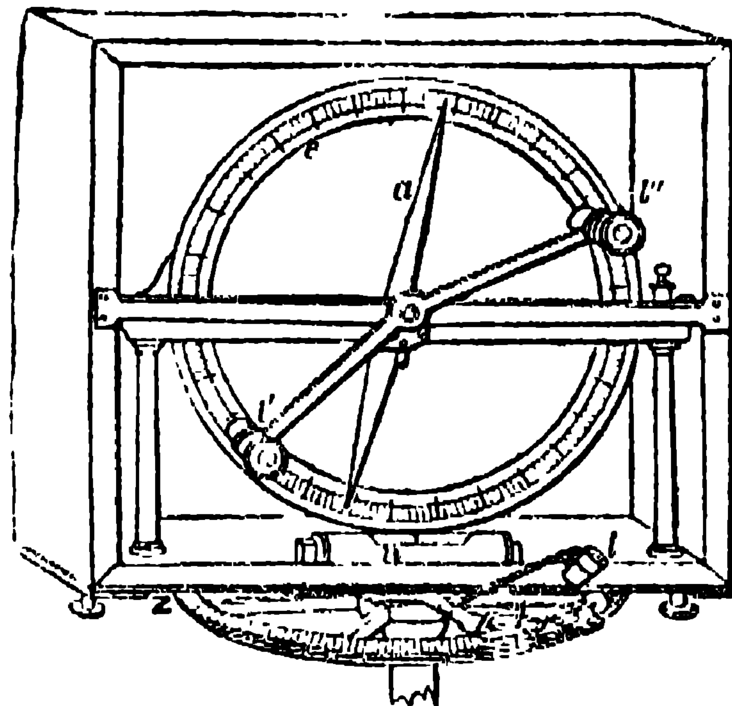
Dipp'el's Animal Oil (*Oleum cornu cervi rectificatum*). This is a colourless transparent liquid, obtained by repeatedly rectifying the liquid products arising from the destructive distillation of animal matter (bone, horn, &c.). It was first prepared by Dippel, an apothecary living in the 17th c., and was employed by him as a medicine. It is colourless, mobile, and highly refractive, and has a pleasant smell and taste like cinnamon. Exposed to the air, it gradually becomes brown. D.'s A. O. consists of a mixture of a great number of substances, part of which are bases containing nitrogen, part compounds of carbon and hydrogen. It is now prepared as a by-product in the manufacture of Bone Black (q. v.). It is occasionally employed in medicine as an antispasmodic.



Dipper—Water Ousel.

Dipp'er, or Water Ousel (*Cinclus aquaticus* or *Hydrobates cinclus*), a species of Insessorial birds, belonging to the Dentirostral section of the order and to the Thrush family (*Merulidæ*). The genus to which it belongs is distinguished by the bill being of moderate size, but curved slightly upwards. The opening of the nostrils is of semilunar shape. The wings are rounded, and have their third and fourth quills largest. The tail is short and even. The tarsi are large, the outer toe being longer than the inner one. The D. frequents rapid streams and rivers, and exhibits quick, jerking movements. Its average length is about 7 inches, and its colour brown on the upper parts, a rusty red below, with the throat and breast white. The food consists of insects, crustaceans, and the eggs of fishes. The D. is remarkable as differing so completely in habits from all the other members of its family. It dives with great ease, and can remain below water for some time, keeping itself under water by the action of its wings. The nest is formed of moss, and has a dome-like shape. The eggs number five, and are coloured white. The D. may produce two or even three broods in a year.

Dipp'ing-Needle is a magnet suspended so as to have as free motion as possible round its centre of inertia in a vertical plane. It is found that such a needle, if not on the magnetic equator, *dips*, or points downwards; and if the plane in which it moves coincide in direction with the magnetic meridian, the needle gives the direction in which the terrestrial magnetic force acts. The magnet is as delicately suspended as possible, and is provided with a vertical graduated circle (marked *e* in the figure) for measuring the amount of the dip, and an azimuth circle (Z) for fixing the vertical circle in the true direction, which is found by means of a declination needle. (See DECLINATION OF THE MAGNETIC NEEDLE.) Since the magnetic axis rarely coincides exactly with the geometrical axis of the magnet, the needle must be reversed—the side which at first faced E. now facing W.—and the mean of the two readings taken as the true reading. Care must be taken not to have any iron or steel adjustments about the instrument, else the results would be rendered valueless. *l*, *l'*, *l''*, are microscopes for reading the angles; and *n* is a spirit-level for securing the horizontality of Z and the perpendicularity of *e*. From observations with such an instrument, Sir J. C. Ross, in 1831, fixed the magnetic pole in Boothia Felix, N. America, near lat. 70° N. and long. 96° W., where he found the dip to be 89° 59'—nearly perpendicular.



Dipping-Needle.

Dipsaca'ceæ and **Dip'sacus**. See TEAZEL.

Dip'sas (from Gr. *dipsa*, 'thirst'), a genus of Colubrine snakes, of which the *D.* or *Eudipsas cynodon* of Asia and the Philippine Islands is an example. The neck and tail are very slender, the head being broad and of triangular shape. The colour is grey, variegated with brown. The ancients believed that this snake was constantly seeking water, hence its name.

Dipsoma'nia (from Gr. *dipsa*, 'thirst,' and *mania*, 'madness'), the name given to an intense craving for intoxicating liquors. So strong is this craving for alcoholic drink in some persons that they will sacrifice everything to obtain it. Of late years, much difference of opinon has been expressed in regard to the question whether D. is insanity or not, some physicians maintaining that it is a kind of madness, others that it is only a kind of wickedness. D. ought to be distinguished from true insanity; but though few physicians would commit dipsomaniacs to a lunatic asylum, most believe that they should be put under restraint, because of their being altogether incapable of taking care of themselves, and also on account of the misery they bring upon their families. D. most frequently occurs among members of families in which there is a hereditary tendency to insanity, and the tendency to the disease is fostered by the habitual use of alcoholic liquors from early periods of life, in many cases even from infancy. Several attempts have recently been made to legislate on D. in the British Parliament, but as yet without effect. There are excellent institutions in Britain for the cure of drunkards, but, unfortunately, there is no law by

which physicians can compel drunkards to be sent to these. Such a law is much required for the good of society.

Dip'tera (Gr. 'two-winged'), an order of Insects represented by the familiar Flies (q. v.) and other two-winged forms. The D. are included in the Holometabolic group of the insect class, or in that section the members of which undergo a *complete* Metamorphosis (q. v.), and show the three characteristic stages of an active caterpillar or *larva*, a quiescent *pupa* or chrysalis, and a perfect winged and sexual *imago*. The front pair of wings are alone represented in these insects, the place of the absent hinder wings being supplied by a pair of filamentous organs, termed *halteres* or *poisers*, presumed to be serviceable to the insects in balancing them in their flight. The prothorax, or first segment of the chest, is always small, and, along with the other two thoracic segments, is generally fused into a single mass. The head is large, and the eyes are prominent. The mouth is for the most part of suctorial kind (see INSECTS), and the stomach is frequently of compound nature. The legs are usually long, and end in soft spongy bodies, by means of which these insects are enabled to obtain a firm foothold on smooth and perpendicular surfaces. In addition to the compound eyes borne by the head, several *ocelli* or simple eyes may also exist; and the antennæ or feelers are situated on the part of the head between the eyes. The wings may be wanting altogether in some D., and the skin of the larva for the most part forms a pupa case for the chrysalis. In some flies (such as in *Pupipara*), the young larvæ reside within the body of the mother, and there become pupæ; and in *Cecidomyia* or the Hessian-fly, each larva produces within itself another larva, which latter feeds on the primitive larva and becomes the future fly. See also articles relating to the various kinds of flies, such as CRANE-FLY, HESSIAN-FLY, &c.

Diptera'ceæ, or **Dipterocarpa'ceæ**, the Sumatra Camphor order, a natural order of Dicotyledonous trees with resinous juice, natives of the forests of tropical India, with the exception of the genus *Lophira*, which is found in tropical Africa, though by some this genus is made the type of a separate order (*Lophiraceæ*). There are about fifty species and seven genera in the order, all of which owe their peculiarities to the presence of the resinous juice. Wood-oil or Gurgun balsam is yielded by the trunks of *D. lævis* or *turbinatus* of the W. Indies. The oil is used in India for painting, and is employed for much the same purposes as Copaiva (q. v.). *Dryobalanops aromatica* yields Sumatra camphor (see CAMPHOR). *Hopea odorata* of Burmah yields a styptic resin. *Shorea* (*Vateria*) *robusta* is the Sal (q. v.) of India, and yields Dhoona pitch. *Vateria indica* yields the oleo-resin known as white Dammar or piny rosin, used in India for making candles and as a varnish. Piny tallow or vegetable butter of Canara—a concrete oil—is obtained from the fruit of this plant, and has lately been imported into this country as a local application in rheumatism, &c. (Bentley). See ANIME, COPAL, DAMMAR, and VARNISH-TREE.

Dip'terus, a genus of extinct Ganoid (q. v.) fishes, confined exclusively in their distribution to the Devonian and Old Red Sandstone rocks. Two dorsal fins existed, and the body was covered with smooth overlapping scales. The head had a kind of helmet-covering, and the teeth were conical in form.

Dip'teryx, a genus of Leguminous plants. The seeds of *D. odorata* of Guiana, owing to the presence of Coumarine (q. v.), are very pleasantly scented, and under the name of *Tonquin*, *Tonga*, or Itonka beans, are used for perfuming snuff, &c. The Eboe nuts of the Mosquito Coast (*D. Eboensis*) are also fragrant, and yield a fatty oil much used for anointing the hair of the natives. The timber is heavy and yellow coloured.

Dip'tych (Gr. *diptucha*, 'doubled,' or 'twice-folded'), in classical and post-classical times the name given to two writing tablets fastened together at the back by means of wires, which served for hinges. They were made for the most part of wood, the inner sides of which were covered over with wax, which was written on with the stilus. There was a raised margin round each to prevent the wax of the one tablet rubbing against that of the other. Diptychs were employed especially for public registers. They were small enough to be held in the hand, rarely exceeding eight inches by four. Instead of wood, ivory and metal were sometimes used, and these were often richly carved or chased.

Dip'us. See JERBOA.

Di'rect and Ret'rograde, two astronomical terms, applied to the motion of a planet, according as it appears to move in the zodiac from W. to E. or from E. to W. When it is moving neither way it is said to be *stationary*.

Direc'tion-Co'sines are the cosines of the angles which a given line makes with three rectangular axes given in position. Take any point (x, y, z) upon the line through the origin, whose D.-C. are l, m, n; then if r be the distance of this point from the origin, we have at once $x = lr$, $y = mr$, $z = nr$. Squaring and adding, we obtain $(l^2 + m^2 + n^2) r^2 = x^2 + y^2 + z^2 = r^2$, or $l^2 + m^2 + n^2 = 1$. Again, if there be another line, whose D.-C. are l', m', n', the angle which it makes with the first is that angle whose cosine $= ll' + mm' + nn'$. These two fundamental formulæ are of great and growing importance in physical investigations.

Direc'tor. In commercial concerns it is usual to have a body of men—commonly about ten or twelve—whose business is to meet at short fixed intervals to consult together about the affairs of the concern, and to advise and assist the manager. The members of this body are called the *Ordinary* Directors. There is commonly another body called the *Extraordinary* Directors. These have no business functions, and are chosen as a rule from their social position being supposed to add to the reputation of the joint-stock undertaking. Ordinary Directors being paid officers, it may be held that they are bound to make themselves thoroughly conversant with the affairs of the undertaking; on the other hand, the remuneration is commonly insufficient to make it reasonable to suppose that they can afford time for this, when the concern is extensive and complicated. On the whole, the view of the commercial community seems to be that a D. is entitled to rely on the statements of the manager, unless these be such as ought to excite the suspicion of a man of ordinary business intelligence. But where this is the case, he is not entitled to shut his eyes. He is bound to have the matter of suspicion probed to the root, and, if necessary, to consult the shareholders. Clearly the position must, in certain circumstances, be one of great danger and difficulty. As if disposing of all objection to the plenary responsibility of a D., the general truth is sometimes stated, that there can be no excuse for the neglect of a voluntarily accepted trust. But the question is as to the exact nature of the trust. A D. is not a manager. His function is to advise, not in ordinary circumstances to investigate.

Law Regarding Directors.—The following are the leading provisions of the Joint-Stock Companies' Act affecting directors: That a director shall vacate his office by the acceptance of any other office of profit in the company, by being concerned in any contract with it, or by bankruptcy; that at the first ordinary meeting after incorporation all the directors shall retire from office, and that at the first ordinary meeting in each subsequent year one-third, or the number nearest one-third, shall retire; those retiring who have been longest in office. They are re-eligible. Directors may delegate their powers to committees. Minutes of business transacted at directors' meetings are to be carefully made, and signed by the chairman. Dividends are only to be paid from profit, and if a dividend is declared when the company is known by the directors to be insolvent, or when payment of the dividend will make it insolvent, they shall be jointly and severally (see JOINT AND SEVERAL) liable for the debts then existing of the company, or which shall be contracted while they remain, respectively, in office.

By 24 and 25 Vict. c. 96, directors, members, or officers of any body corporate or public company fraudulently appropriating property, or keeping fraudulent accounts, or wilfully destroying or vitiating books, or other writings, or publishing any false statement with intent to deceive, are guilty of a misdemeanour, punishable with penal servitude or imprisonment, according to degree of guilt. See JOINT-STOCK COMPANIES.

Direc'tory was the executive power in the new constitution of the *Thermidoriens* introduced in 1795. It was a council of five persons, who had the conduct of peace and war, the execution of the laws, and the general administration without legislative functions. The D. along with the formation of the Double

Council (viz., the Ancients and the Five Hundred) distinguish this Constitution of year 3 from the Girondist Constitution of 1791, the Democratic monarchy of 1792, and the Jacobin Constitution of 1793. The 'decrees of the two-thirds,' by which the Old Convention insisted on modifying the proposal of the eleven Girondist commissioners, led to the 'Day of the Sections' (4th October 1795), in which Bonaparte destroyed the National Guards in the Rue St Honoré. Barras and Carnot (who replaced Sieyès) were the most prominent Directors, all of whom were elected by the two Councils. The D. soon became unpopular in spite of Bonaparte's brilliant campaigns. They crushed the Babœuf Conspiracy (1797), and Pichegru and the Royalist party on the 18th Fructidor; but their policy of *bascule*, or seesaw between the Moderates and the Manège Club in home affairs, their cruel Law of Hostages, and their misunderstandings with Bonaparte, who was the idol of the army, paved the way for the negotiations of Sieyès which resulted in the Revolution of 18th Brumaire and the Consulate.

Directory for Public Worship of God, one of the works of the Westminster Assembly, drawn up in 1644. George Gillespie, the Scottish commissioner, had a chief hand in framing it. The order of worship prescribed begins with an invocation; a chapter from each Testament is read; and the Lord's Prayer and other set forms are used. Baptism, marriage, and rebuke are to be public; and burial, without ceremony. The General Assembly of the Church of Scotland adopted the D., February 3, and the Scottish Parliament ratified it, February 6, 1645. The D., however, was not recognised at the Revolution Settlement, nor at the Union. The book was the expression of a fond illusion that uniformity of worship could be established, so as to secure the happy unity of the kirks of the three kingdoms. See *A Directory for the Public Worship of God* (Edinb. 1645); Principal Lee's *Hist. of Church of Scotland* (Edinb. 1860); Dr R. Lee's *Reform of the Church of Scotland* (Edinb. 1864); and *Minutes of Westminster Assembly* (Edinb. 1874).

Direc'trix, in geometry, is a straight or curved line on which depends the description of a curve or surface. A point, whose distances from a given point and straight line bear a constant ratio to each other, describes one of the Conic Sections (q. v.). This straight line is the D. of the curve in question. If a surface be generated by the motion of a line which always rests on other fixed lines, these latter are sometimes called *directrices*, but more frequently *directors*; the moving line is called a *generator*.

Dirk, a Scottish dagger or poniard formerly carried by Highland chieftains; also the name for the short sword worn as a side-arm by midshipmen in the British royal navy.

Dirk Hartog Island is one of several islands forming a breakwater for the extensive inlet of Shark Bay, on the W. coast of Australia. D. H. I. is high, and about 40 miles long by 10 broad. It lies in S. lat. 25° 28'-26° 6', and E. long. 113°.

Dir'schau (Pol. *Szczevo*), a town of W. Prussia, on the Vistula, and on the Eastern Railway, 21 miles S.S.E. of Danzig. It has iron and machine works, large mills, a cattle-market, and an active timber trade. The Vistula is here crossed by an immense iron bridge, 2844 feet long and 37 feet high, erected 1850-60. Pop. (1872) 7758.

Dirt-Beds, a name given by geologists to certain deposits embraced by the Portland or Upper Oolite rocks, and more especially in connection with the Purbeck beds of these formations. The name 'D.-B.' is applied to these formations by quarrymen, and denotes old soils in which vegetable matter is thickly interspersed. These beds are in all likelihood old land surfaces formed between strata of marine origin by the intermittent elevation of the latter. Fossil cycads (*Mantellia*) form their chief vegetable remains.

Disabil'ity, in English law, is legal incapacity. It may be absolute, as by Outlawry (q. v.); or it may be partial, as from minority (see AGE) or Coverture (q. v.). See also CAPACITY, LEGAL.

Disban'ding, in military language, is the breaking up of a battalion or regiment. It generally occurs when peace is proclaimed after war, the officers being placed on half-pay, and the men discharged. But it was also resorted to in India to punish the mutiny of the native troops—the first instance being the D. of the 19th regiment of native infantry at Barrackpore on the 1st of March 1857.

Disbar' is to degrade a barrister-at-law. The power to D. in England belongs to the Benchers (q. v.) of the four Inns of Court. No barrister who has been disbarred can plead before the courts of law. The last exercise of the power was in 1874.

Disc, or **Disk**, a somewhat vague term in systematic botany, generally applied to any organ 'intervening between the stamens and the ovary,' and may be in the form of a ring or scales. Frequently it consists of metamorphosed stamens forming an inner whorl. Sometimes it is glandular and secretes a honey-like fluid: in this case the older botanists called it the *nectary*.

Disc and **Discob'olus**. See QUOITS.

Discharge'. A verbal obligation may be dissolved by a verbal D., but a written obligation requires a written D.; the rule of law being that the same solemnities required to constitute an obligation are required to extinguish it.

Dischar'ging, in the navy, is relieving the ship of the commission under which it is placed in active service, the officers on full pay and the crew on the wages list. The fact that officers and crew can only serve on board ship puts them on a different footing from the officers and men in a regiment. Soldiers are on permanent pay during peace and war, sailors only while the ship is in commission. D. leaves the men off the wages list, and the officers mostly on half pay.

Dis'cina, a typical genus of Brachiopodous ollusca, represented by living forms, and also by fossil species, which begin in the Silurian period. The family *Discinidæ* is recognised by the shells being attached to fixed objects by a fleshy stalk or peduncle, which passes through the ventral valve. The characteristic arms of the *Brachiopoda* (q. v.) are fleshy in *Discinidæ*, and the valves or halves of the shell are not articulated by any distinct hinge. The shell in D. is circular, its upper valve being limpet-shaped, the lower valve being flat or convex. *D. circe*, and *D. pelopæa* are well-known fossil species from Silurian rocks.

Dis'cipline, The First Book of, or **Policie**, an important landmark in the reformation of the Scottish Church. After the overthrow of Popery and the adoption of the ancient Confession in 1560, a commission, dated April 29 of that year, was given to John Knox and five others to draw up a B. of D. According to this B. of D., the minister was to be admitted with consent of the people and the approval of the ministers; ordination by imposition of hands was disapproved of; readers were to be provided for destitute places; the country was to be divided into ten districts, with superintendents for planting churches, appointing ministers, and visiting vacant places; elders and deacons were to be elected annually; every church was to have a schoolmaster; and the ancient patrimony of the Church was to be devoted to the threefold support of the ministry, education, and the poor. This book was dated May 20, 1560; and on January 27, 1560-61, it was subscribed in secret council by twenty-six noblemen and gentlemen, but it was never ratified by Parliament. It failed to become law because those who held the patrimony of the Church did not regard Knox's 'devout imagination' with favour. See *The First and Second Booke of D.* (Edinb. 1621); M'Crie's *Life of Knox* (Edinb. 1812); *Knox's Hist. Ref.* (Laing's ed., Edinb. 1848); and Cunningham's *Church Hist. Scotland* (Edinb. 1859).—**The Second B. of D.** was the result of an effort to make the Church of Scotland more strictly Presbyterian. The great reformer, Andrew Melville, and some others, were appointed, April 24, 1576, by the General Assembly, a committee to perfect the regulations of the Church. As the fruit of their labours they presented the Second B. of D., which was sanctioned by the General Assembly, April 24, 1578. This book set up a more elaborate form of Presbyterianism, and made a more complete distinction between civil and ecclesiastical jurisdiction. Patronage was abolished, also the titles of abbots, and the superiority of bishops; ministers were to be elected by judgment of eldership and consent of the people; ordination was to be by laying on of hands; and the various Church courts were appointed. The Second B. of D. was registered among the Acts of the Church by the Assembly, April 1581; but it never was ratified by Parliament, and never became a binding law of the Church.

See M'Crie's *Life of Melville* (Edinb. 1824), and Bryce's *Ten Years of the Church of Scotland* (Edinb. 1850).

Disclaim'er, in English law, is a plea of denial or of renunciation.

Disclama'tion, in Scotch law, signifies the disavowal by a vassal of some one who is, or claims to be, his Superior (q. v.). The penalty of D. on frivolous grounds is forfeiture of the Fee (q. v.). But any reasonable excuse will exempt the vassal from the penalty.

Discob'oli, a term formerly applied by Cuvier to certain genera of fishes, exemplified by the Lump-Suckers (q. v.), &c., with sucking-discs formed by the united ventral fins on the lower surface of their bodies. The term is not now used, lump-suckers being included in the *Gobiidæ* or Gobies (q. v.).

Discoph'ora (Gr. 'disc-bearers'), a name given in modern zoology to a subclass of Hydrozoa (q. v.), represented by the true *Medusidæ* (q. v.), or sea-blubbers and jelly-fishes. These organisms may be defined as possessing a free, oceanic body (*hydrosoma*), consisting of a single *nectocalyx*, or swimming-bell, from the roof of which a single zoöid or *polypite* hangs. A system of canals runs through the swimming-bell. Many forms at one time regarded as *Medusæ* are now known to be merely the free-swimming reproductive bodies of zoophytes.

Dis'cord, in music, an interval producing Dissonance (q. v.). Strictly speaking, an interval is said to be *dissonant* if the notes of which it consists have any musical relation to each other, and *discordant* if they have none.

Dis'count is the deduction made from a debt paid before it is due. To discount a Bill of Exchange (q. v.), or a draft, means to exchange it under deduction of a percentage on account of its not having reached maturity. When this is done, it is the custom of money-dealers to subtract the interest accruing during the time between the date of their purchase and the date at which the bill or draft falls due. This causes the real charge to be greater than the nominal one, the interest being received by the lender before it is due. Thus, if you discount a bill of £100 due three months hence at 5 per cent., you will receive £100 less ¼ of £5—that is, £98, 15s.; but if you then lend your £98, 15s. for three months at 5 per cent., it is plain that the interest accruing during the period cannot be so much as the interest on £100 which has been deducted. In a true calculation of D., therefore, the question to be answered is—What sum will, at the given rate of interest, at the end of the given period, amount to the value of the deferred payment? The rule for ascertaining this is—Find the amount of £1 in the given time, and by that divide the given sum, and the quotient is the answer. Thus, What is the value of £100 to be received three months hence, interest at 5 per cent. The interest of £1 for a year will be 1s., and for three months 3d., = £0·0125. The amount of £1 therefore for the period is £1·0125; and the value of £100 three months hence is = $\frac{100}{1\cdot0125}$ = £98·765 = £98 15 3½
The interest on which for three months at 5 per cent. is 1 4 8½

£100 0 0

To find the amount of a given sum improved at compound interest at any rate, and for any number of years, the rule is—Multiply the amount of £1 for a year so often into itself as there are years proposed, and the last product multiplied by the principal gives the answer. Thus—What will £10 amount to in three years at 5 per cent. compound interest—1·05 × 1·05 × 1·05 = 1·157625 × 10 £11·57625 = £11, 11s. 5d.

By D. is also understood the depreciation of any share or stock below the original value. Thus, when a bank share on which £100 has been paid will only bring £90 in the market, it is said to be at a D. of 10 per cent. The converse position is called being at a *premium*.

The rate of D for bills of exchange in the United Kingdom, in ordinary times, ranges from 3 to 5 per cent. on bills of three or four months' currency. When it goes above 5 per cent. the fact indicates commercial disturbance. In recent times the rate has more than once risen as high as 10 per cent. The provincial banks, in their D. rates, follow the lead of the Bank of England. See INTEREST.

Discre'tion. According to English law, if an agent or trustee is instructed to act according to his D., he must act according to law and reason. The law of Scotland recognises the same rule.

Dis'cus proligerus, a small heap of granular cells found within a graafian vesicle, and on which the ovum rests. See GRAAFIAN VESICLE and OVUM.

Discus'sion is a technical term of Scotch law, signifying a demand for payment against a principal debtor or against heirs. Formerly cautioners (see CAUTION), unless bound jointly and severally (see JOINT AND SEVERAL) with the principal debtor, could insist on the creditor enforcing his demand against the principal debtor in the first place, or to *discuss* him, as it was called. By the Mercantile Law Amendment Act, cautioners can now only have this right by stipulation.

Discussion of Heirs.—All heirs who have incurred a representation of their ancestors are liable for his debts; but they may insist on being sued in a certain order. Where a special heir is burdened with a debt, the creditor must *discuss* that heir before he can insist against the heir-at-law. But where the debtor does not charge any special heir with payment of a general obligation, the D. must be in legal order. See REPRESENTATION, TITLE, PASSIVE.

Disdi'aclasts, minute doubly-refracting molecules, which, according to Bricke, form part of the ultimate structure of muscle. See MUSCLE.

Disease' (lit. the opposite of *ease*), a medical term for that condition of the system in which there is a deviation from health. D. may or may not be accompanied with pain, but there is always a departure from the normal standard of health. D. may be local or general, structural or functional, curable or incurable, the latter always ending in death. The classification of D. is called Nosology (q. v.), and the changes in structure caused by it form the subject of Pathology (q. v.).

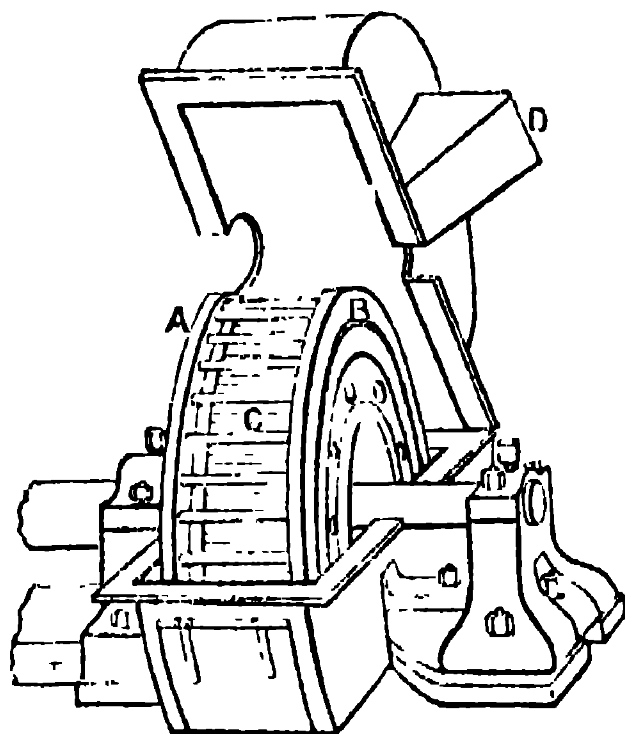
Disease, Acts Respecting. By 29 and 30 Vict. c. 35, and 32 and 33 Vict. c. 96, provision is made for the prevention of contagious D. in certain towns which are military stations. By the Sewage Utilisation Act, the sewer authorities in England are in boroughs the municipal corporation; in other towns, those intrusted with cleansing or paving. Several amending Acts have been passed. By the Sanitary Act of 1866, a house-owner may be called on to remedy deficient draining within a reasonable time. If water supply is inadequate, the authorities may dig wells, make reservoirs, &c. The Act defines a *Nuisance* (q. v.), and provides against infection. Cattle-plague is dealt with by the last Act. Cattle may be slaughtered to ascertain the nature of a D. No animal is to be moved alive from any infected place. Local authorities are to appoint an inspector, who, when plague is found to exist, is to make an official declaration of the place infected.

Diseases of Plants may be referred to four causes—(1) Parasitic fungi or other plants attacking the tubers; (2) Insects causing galls, fissures, wounds, &c.; (3) Poisonous gases in the air or soil, or any poisonous material so placed as to affect nutrition; (4) Atmospheric or other causes, 'so affecting the plants as to alter the conditions of nutrition by giving a redundancy or deficiency of air, light, moisture, warmth, &c. The principal D. are noticed in this work under their own names.

Dishon'our, a term of mercantile law, denoting the refusal of the drawee in a bill of exchange or cheque to accept or pay it. If a bill be presented and acceptance refused, or a qualified acceptance only offered, prompt notice must be given to all the parties to whom the holder intends to apply for payment. In case of a foreign bill, notice should be sent by first post or earliest opportunity. Generally, in both foreign and inland bills, notice is given next day to the immediate endorser, who is allowed a day to give notice to those who are liable to him. Delay in giving notice frees the drawer and endorsers from liability. No particular form of notice is required, but it is well to send a copy of the bill. A person having taken a cheque in payment of a debt cannot sue for the debt until the cheque has been dishonoured; but a creditor is not bound to accept a cheque (case of Hough *v.* May, N. & M. 535). If the holder of a cheque accept payment in bank-notes, and the bank fail, the holder has no recourse against the drawer of the cheque. See BILL OF EXCHANGE, CHEQUE.

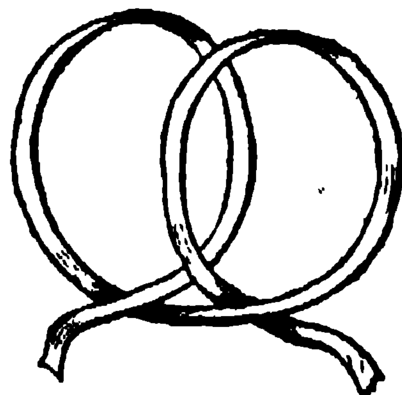
Disinfec'tants are substances which by a chemical action destroy contagious matters or effluvia from decaying animal and vegetable substances. Chlorine (q. v.) is one of the best and most powerful D. It decomposes the compounds of hydrogen, and thereby substitutes a harmless for a hurtful compound. Bleaching-powder depends for its action as a disinfectant on the chlorine it contains, as well as chlorate of soda. By adding an acid to these substances free chlorine is given off more freely. Charcoal, permanganate of potash, or Condy's fluid, chloride of zinc, or Burnett's disinfecting fluid, steel drops, sulphur dioxide, hydrate of chlorine, and carbolic acid, are all useful; but dry heat, when it can be applied, is probably the most efficient of all D.

Disin'tegrator, a machine for pulverising, or disintegrating various soft or hard materials. The patent D. of Mr Thomas Carr, Montpelier, Bristol, held in much favour for breaking up ores, rock, asphalt, artificial manures, peat, fire-clays, oilcake, also for mixing moist sugars, the ingredients of mortar, &c., is here figured. It consists of a pair of circular metal discs, A and B, fixed to two separate shafts on one side of the machine, the shaft of the right-hand disc working through the tubular shaft of the left-hand one without touching it; an arrangement which leaves the hopper, D, by which the machine is fed with materials, unobstructed with driving-belts. The inside faces of the discs are studded with four concentric rings, or cages, of very strong projecting bars, or beaters, C; the rings of beaters in one disc occupy the opposite alternate interstices of the other, and the discs are driven in opposite directions at a high speed, varying from 350 to 500 revolutions per minute. The material to be ground being introduced through the hopper, is beaten, in its passage through the machine, with great violence by the beaters of the successive cages revolving in opposite directions, so that disintegration is thoroughly effected before the particles reach the end of their zigzag course to the circumference of the discs. A mineral D., 4½ feet in diameter, can pulverise from 5 to 15 tons of material per hour, according to the hardness of the material and the degree of fineness required. The disintegrating flourmill of the same inventor has a similar construction, and its efficiency may be judged from the fact that one seven feet in diameter produces as much flour, of a superior quality, as thirty pairs of millstones, and at a less cost.



Disintegrator.

Disloca'tion (Lat. 'a displacing') occurs when two bones which form a joint are displaced, and put 'out of joint.' It is often the result of violence, but sometimes of disease; and occasionally it is congenital, as in club-foot. Some joints, from their construction, especially the ball and socket joints, as the shoulders and big joints, are the most common seats of D. After these it occurs most frequently in the elbow. It is rare in children and in old age; in the latter, fracture is common. D. is liable to recur in the same joint. Surgeons divide it into partial and complete. In the latter, an external wound communicates with the joints. The symptoms are distortion of the limb, much pain, and often swelling in the neighbourhood of the joint. There is generally immobility of the limb, and always inability to use the joint. In all cases of D. there is more or less laceration of the parts around the joint. The treatment consists in returning the bones into their proper position, and maintaining them until the lacerated tissues are healed. This is effected by the surgeon in different ways, according to the joint implicated. When it is necessary to apply traction, the surgeon often does this by means of a hank of worsted applied in such a way that the traction does not cause the worsted to tighten round the limb. For this purpose the method adopted is what is termed the 'clove-hitch.' Occasionally it is necessary to use pulleys. In all cases it is good to give chloroform both to prevent pain and to relax the muscles.


Clove-hitch.

Dislocation, or **Fault**, in geology, the name given to the phenomena seen in rocks, where a crack or fissure has been formed in a series of strata, and where a displacement of the rock on either side has materially altered the original 'lie' or position of the strata. Faults vary much in nature and extent, and their effects are modified by the character of the rocks in which they occur. The dislocated strata may remain on each side of the fissure comparatively undisturbed, or may be, on the other hand, greatly bent and disturbed along the plane of the fault. Dislocations may be longitudinal ('strike faults'), or several faults may apparently proceed from one point or centre. The study of faults is of immense importance to the miner, since their occurrence in beds of coal may seriously interfere with the continuity of the seams, and cause much trouble and expense in determining the exact effects of the D. and the altered relations of the strata. The terms 'hitch,' 'slip,' 'slide,' 'heave,' and 'throw,' are applied by miners to faults.

Dis'mal Swamp, a large morass on the boundary of Virginia and N. Carolina, 30 by 10 miles, having an area of 300 sq. miles. It was formerly covered with immense trees and dense brushwood, and was a famous refuge for runaway slaves, but is now partially cleared and drained. It contains Lake Drummond, and is crossed by the D. S. Canal, 23 miles long and 6½ feet deep.

Dis'mas, St, in mediæval legend, is the name of the penitent thief.

Disor'derly House. See NUISANCE.

Dispart', in gunnery, is half the difference between the diameters of the breech and muzzle, and is of great importance to the gunner in taking aim.

Dispensa'tion is a licence granted by the Pope to do some act otherwise illegal. The limits of the power having been the subject of controversy among many learned theologians, we shall not endeavour to define them. The Church, according to its own view, is empowered by God to release from vows, and to authorise marriages within degrees of relationship prohibited by the canon law. In former times, at least, it was a simple matter to apply the power to a wide department of civil affairs, by declaring that they bore upon affairs ecclesiastical. It is now of course only in Roman Catholic countries that D. is of any effect. In England it was abolished by Henry VIII., the power of the Pope in a very restricted form being then conferred on the Archbishop of Canterbury.

Disper'sion, of a pencil of light-rays, is the angular separation of the extreme rays of the spectrum after emergence from the prism, or, more correctly, is the difference of the indices of Refraction (q. v.) of these extreme rays. Experiment shows that the dispersive powers of different materials for light are not proportional to their refractive indices, a fact which renders possible an achromatic arrangement of lenses. See OPTICS.

Displayed', in heraldry, is a term applied to any bird of prey with its wings expanded.

Disposi'tion, in art, is the arrangement of the parts of a picture so that the form and colour of each part shall have its due effect. It differs from *composition*, in which the arrangement or design has for its aim and purpose the production of a general effect, to which all the parts contribute.

Disposition, in Scotch law, is a deed of alienation by which either heritable or movable property is conveyed. The person to whom it is granted is called the *disponee*.

Disposition of Heritage.—The disponer or maker of the deed 'sells and dispones,' or, where the deed is gratuitous, 'gives, grants, and dispones,' the subject of the deed to the receiver, who is called the disponee.

Disposition of Movables is a deed by which the disponer conveys his movable estate, wholly or partially, to the disponee.

This deed can only be made effectual by delivery of the subjects conveyed.

Disposition and Settlement is a deed by which a person provides for the general disposal of his property, heritable and movable, after his death. See DESTINATION, WILL.

Disposition in Security.—This corresponds to mortgage in England, and will be explained under *Heritable Security.*

Disrae'li, Benjamin, Earl of Beaconsfield, K.G., a distinguished statesman and man of letters of the 19th c., was born in Islington, December 21, 1804. The eldest of Isaac D'Israeli's three sons, he was privately educated at home, at Winchester, and at Walthamstow, was baptized in 1817 (the year of his father's final severance from the Portuguese Synagogue), and at an early age entered an attorney's office. The work, however, proving irksome, he abandoned it; and after extended travel, in the course of which he made the acquaintance of Lockhart, the son-in-law of Sir Walter Scott, and then editor of the *Quarterly Review*, he settled down to literary work. In 1826 he made his first successful hit in public with the brilliant and romantic novel of *Vivian Grey*, which was followed by *The Wondrous Tale of Alroy, The Young Duke, Contarini Fleming*, and *Henrietta Temple*, all of which obtained for their author notoriety rather than fame. At the same time D. prepared the way for his entrance into political life by publishing *Ixion, A Vindication of the British Constitution*, and a poem, *The Revolutionary Epic*, which nobody is supposed to have ever read. Again D. travelled, this time in the East, and on returning plunged into the political strife that attended the great Reform agitation. He became, in 1832, a candidate for the burgh of Wycombe, and as he was recommended by Hume and O'Connell, it has been inferred that he began his active political career as a Radical, though he himself invariably affirmed that his political conduct was from first to last consistent. In 1835, when he contested Taunton, unquestionably as a Tory, and under the auspices of Lord Lyndhurst and Sir Robert Peel, he was beaten, and came into collision with O'Connell and his son, the latter of whom he challenged to fight a duel. At last, in 1837, at the age of thirty-three, he was elected a member for Maidstone. In making his maiden speech in the House of Commons, he was so disconcerted by the laughter which greeted his peculiar rhetoric and exaggerated gestures, that he sat down, saying, however, before he did so, 'I will sit down now, but the time will come when you will hear me.' D. then carefully studied both elocution and the temper of the House of Commons, and the result was soon seen in a marvellous parliamentary success. In 1841 he exchanged the constituency of Maidstone for that of Shrewsbury. Mainly by new novels, combining fiction and politics, the chief of which were *Sybil* and *Coningsby*, he became known as the chief of the 'Young England party.' His fortune as a partisan was made when, on Sir Robert Peel becoming a convert to free-trade doctrines, he attacked that great statesman with fiercely eloquent and persistent invective. Identifying himself with the Protectionists, D., who had exchanged Shrewsbury for Buckinghamshire, became, in 1848, on the death of Lord George Bentinck, their acknowledged chief. In 1852, after publishing a biography of Lord George Bentinck, he became Chancellor of the Exchequer in the cabinet of Lord Derby. Since then the history of D. may be said to be that of the Conservative party. In the three administrations of Lord Derby he held the post of Chancellor of the Exchequer, passing in the last, with the unwelcome assistance of the Liberal opposition, the Reform Acts which are now law. When his chief resigned the Premiership in February 1868, D. succeeded to it. In the end of the same year, however, he resigned, the general election of the time returning a majority against him on the Irish Church question. In March 1874, another general election giving his party a great majority, D. was again called to the post of First Lord of the Treasury; in 1876 he was raised to the Upper House as Earl of Beaconsfield and Viscount Hughenden. The Berlin Treaty (1878), the crown of his 'imperialistic' policy, was followed by the Afghan and Zulu wars; and an appeal to the country in the spring of 1880 resulted in the unlooked-for triumph of the Liberals. The leisure of ten years earlier had yielded *Lothair*, and this now yielded *Endymion*. The name of the setting sun-god! and *Endymion's* author passed away in London, April 19, 1881. He was buried at Hughenden, Bucks, by the side of the wife whom, as widow of Mr. Wyndham Lewis, his Maidstone colleague, he had married in 1839. She was, in 1868, raised to the peerage under the title of Viscountess Beaconsfield, and died December 15, 1872, at the age of eighty-three, leaving no issue. No contemporary, scarce any bygone, politician was the subject of such various and conflicting criticism as D. His sincerity and sagacity were repeatedly challenged; his powers of leading often seemed misdirected, his serious eloquence excited no enthusiasm or admiration, yet his tact, audacity, ironical pleasantry, subtle humour, and unfailing courage, won him a personal popularity which his great rival could never secure, and which no modern statesman, except Lord Palmerston, has enjoyed in equal measure. See T. P. O'Connor's *Lord B., a Biography* (Lond. 1879; new ed. 1881).

D'Israeli, Isaac, one of the best English literary anecdotists, was born at Enfield, May 1766. His father, Benjamin D., was the descendant of a Hebrew family that had been driven from Spain to Venice by the persecutions of the Inquisition, and settled in business in England in 1747, where he made a fortune. D. was educated at Amsterdam and Leyden, and devoted himself from an early age to literature. He at first attempted satirical poetry, but found his vocation in literary and historical studies. The first volume of his *Curiosities of Literature* appeared in 1791. It is a classic in its way. It was followed by *A Dissertation on Anecdotes* (1793), *Essay on the Manners and Genius of the Literary Character* (1795), *Calamities* and *Quarrels of Authors* (1812–14), *Inquiry into the Literary and Political Character of King James I.* (1816), *Commentaries on the Life and Reign of Charles I.* (1828–31), *Eliot, Hampden, and Pym* (1832), and *Amenities of Literature* (1841). D. has a quaint, felicitous, but artificial style, on which his brilliant son's was distinctly modelled. But the elder never displayed the golden graces of the younger. D. died at Bradenham House, Bucks, January 19, 1848. A collected edition of his works, with a Life, was published in 1858 by his son.

Disrup'tion. See FREE CHURCH OF SCOTLAND.

Diss, a market-town of Norfolk, in the vale of the Waveney, 18 miles S.S.W. of Norwich, has brush manufactories, breweries, and malting establishments. St. Mary's Church, a fine Gothic building (restored 1877), has a square tower, containing a peal of bells. Skelton, the poet-laureate in the reign of Henry VII. and Henry VIII., was rector of D. Pop. (1871) 3851.

Dissec'tion, the method followed in anatomical schools of displaying the structure of the body in the dissecting-room, so as to enable each student to obtain as much information as possible without interference with neighbouring dissectors. The body is usually divided into ten parts, five on each side of the body, which are left in connection with one another until the D. is far enough advanced to admit of their being separated. See Quain's *Anatomy*, vol. ii. p. 1047.

Dissection Wounds are poisoned wounds received during dissection, or in making a post-mortem examination of a dead body. The virus or poison may be that of the disease from which the person died, or simply the virus of putrefaction. The former is the more dangerous. A body is more apt to produce serious results immediately after death than at a later stage. D. W. are generally caused by a puncture, and the more freely they bleed the less is the danger to the person wounded, because the blood flowing from the wound has a tendency to wash out the poison. When D. W. do not bleed freely, the wound should be enlarged with a clean knife, and in all cases washed, sucked, and afterwards cauterised with nitrate of silver, or by actual cautery. Frequently D. W. cause great constitutional disturbance. Sometimes they are followed by abscesses in the armpit, and gangrene of the diseased limb, necessitating amputation, and even causing death. In the robust, however, they seldom prove dangerous.

Dissen'ters, the name applied in Great Britain to those religious communions which, differing in either doctrine or discipline, or both, from the Episcopal and Presbyterian Churches established by law in England and Scotland, do not participate in the public support of these churches. During the 16th c. in England, Catholics and Puritans were persecuted with extreme rigour. The first instance of actual punishment inflicted on Protestant D. was in June 1567, when a company of 100 were seized at worship in Plummer's Hall, and several sent to prison. The idea of toleration, which France had proclaimed in the Edict of

Nantes (1598), was unknown. Whitgift controlled the policy of the Church towards D., and in the earlier part of the 17th c. Archbishop Laud, by the aid of the High Commission (which the royal prerogative had armed with illegal powers to fine, imprison, pillory, and mutilate), had almost succeeded in stamping out all visible signs of Nonconformity. Under Cromwell the Puritans were as intolerant and meddling as Laud; they prohibited the use of the Book of Common Prayer; they defaced churches and burnt pictures. On the Restoration it was made a crime to attend a dissenting place of worship, the penalty being transportation on a third offence, and death on return; and a further test was imposed on such divines as had been deprived of their benefices for Nonconformity, *i.e.*, for not accepting the English Book of Common Prayer. (The Act of Uniformity is 13 and 14 Car. II. c. 4.) This persecution increased under James II. In 1687, however, James thought of banding all Nonconformists against the Established Church, and granted a partial measure of toleration for Scotland, Catholics and Quakers getting the right of public worship, Presbyterians only that of private worship. This was followed by the unconstitutional Declaration of Indulgence, which repealed not only the penal laws against Catholics and Puritans, but even the tests for civil and military office. The 'Five Mile Act' and the 'Conventicle Act' had previously been modified in operation by a similar declaration of Charles, which was immediately cancelled as illegal. The D. now separated into the Court party, led by Lobb (Independent), Care, Alsop, and Rosewell (Presbyterians), and Penn (Quaker), and the Church party, to which Baxter, Howe, and Bunyan belonged. The latter were in a great majority; and in spite of the efforts of the Board of Regulators of Corporations (who dismissed Tory and appointed Puritan magistrates and officers by hundreds), the D. supported the cause of the constitution, and even sympathised with the Bishops in the Tower. From what is called the Revolution Settlement—a toleration without equality of civil rights—the Unitarians were excepted, and the celebration of the Catholic mass continued to be for long prohibited. In 1779 the ministers of dissenting congregations and schoolmasters were relieved from the necessity of subscribing the Doctrinal Articles of the Church (19 Geo. III. c. 44). As in the case of Dr Calamy, however, this subscription had frequently been dispensed with, and the Occasional Conformity Act of 1711 freed non-subscribers from the penalties. After the French Revolution a tide of liberal legislation set in. In 1813 an Act repealed the excepting clause of the Toleration Act against Unitarians, and also the Act of William which made it blasphemy to deny the divinity of Christ. The same statute led to the passing of the Act 57 Geo. III. c. 70 for Ireland, which extended complete toleration even to Unitarians. The Irish Toleration Act did not pass till 1719, and required no declaration of belief in the Trinity. The Test and Corporation Acts followed in 1828, and the universities have since been thrown open to D. No measure, with regard to their legal position, has excited greater interest than the Dissenters' Chapels Act, 7 and 8 Vict. c. 45, which was carried through by Lord Lyndhurst, Sir Robert Peel, Sir W. Follett, and Mr Gladstone. The question was whether chapels, burial-grounds, schools, and ministers' houses, in the possession of Unitarian congregations, should be forfeited, because, at the time of the original endowment, the congregations held different opinions in theology. The Court of Chancery, in the case of Lady Hewley's trust, &c., had decided that new trustees must be appointed, and an Act then became necessary to secure other trusts in a similar position. In the proceedings it appeared that when in 1719 the 'Bill for strengthening the Protestant interest' (5 Geo. I. c. 4) was brought forward to repeal the restrictive portions of the Schism Act (12 Anne, c. 7), and the 'Occasional Conformity Act,' an attempt was made, and failed, to add to the Oath of Abjuration a declaration of belief in the ever-blessed Trinity, and that in the celebrated Salter's Hall Controversy (1719) a general meeting of all the English D. declined to say that the doctrine of the Trinity should be a term of communion. The three great bodies of English D.—the Presbyterians, Baptists, and Independents—have a joint organisation called the 'Three Denominations,' with the right of addressing the sovereign in presence. This right has been lately exercised. D. from the National Established Church in Scotland can hardly be said to have existed prior to Erskine's secession of 1733; as the Cameronians, or Hill Men, the descendants of the Remonstrants of the Sanquhar Declaration, were rather the growth of the wars of the persecution, and their principles put them out of relation with all other classes. In 1747 the Associate Synod split into the Burghers and Anti-Burghers, and those again into the New Light Burghers, the New Light Anti-Burghers, the Old Light Burghers, and the Old Light Anti-Burghers. At the present time the bulk of these secessions from the Established Church are reunited in the United Presbyterian Church. The Episcopal Church was tolerated under the Act 5 Geo. I. c. 28, only qualified persons being allowed to hold divine service. They had themselves a fierce dispute between the College party under Lockhart and the Usagers under Gadderer. The Church was so much identified with the Rebellion of 1745, that statutes were passed narrowing the definition of a congregation (so as to encroach on private worship), and requiring letters of orders from English or Irish bishops in every case. There was, of course, a good deal of secret Catholicism, the principal stations of Jesuitism being Munches, Edinburgh, Aberdeen, Braemar, and Strathglass. In 1773 there were only seven Jesuit missionaries in Scotland. In the N. of Ireland the Presbyterian D. lived in harmony till the beginning of the 19th c., when the Trinitarian and Unitarian parties, under Drs Cook and Montgomery respectively, separated, each retaining its share of the *Regium Donum* down to the Irish Church Act of 1869. In 1854 some excitement was created by Lord John Russell's Ecclesiastical Titles' Act, prohibiting the use of British geographical names in the titles of the Catholic clergy. The Act was never put in force. The right of Dissenters to burial, with an appropriate service, in the parish churchyard, was not conceded till 1880. See Herbert Skeat's *History of Free Churches*.

Dissenters, Laws Regarding. See ACT OF TOLERATION.

Dissep'iments. See PISTIL and FRUIT.

Dissolu'tion of Marriage. See DIVORCE, DIVORCE AND MATRIMONIAL COURT.

Dissol'ving Views are produced by employing two magic lanterns, so arranged that their respective images may be superimposed on the screen, and that, as the one is made to fade away gradually, the other increases in brilliancy, thus producing the appearance of the one dissolving almost imperceptibly into the other.

Diss'onance, in music, a disagreeable roughness produced when certain notes are sounded together. See CONSONANCE.

Dis'taff (Old. Eng. *distaef*, 'the bunch or tuft of flax on the staff'), an implement formerly used for holding flax, wool, or other fibres in the process of spinning yarn from them. It is mentioned in the Proverbs of Solomon, 'She layeth her hands to the spindle, and her hands hold the distaff;' and frequent allusion is made to it by Homer and other classical writers.

Distem'per (Fr. *détrempe*, from Lat. *de*, and *temperare*, 'to temper'), a method of painting and illuminating in use almost throughout the middle ages, with pigments ground up with size, weak glue, gum-water, or other vehicle instead of oil. It is still used for scene-painting, the decoration of staircases, &c., and within recent years in house-decoration, in which the chief mass or field of colour is often laid on in D., relieved by a border in stencilling, or partly stencilled, partly hand-painted. The brilliancy of some of the older pictures in D. was obtained by using a varnish of wax dissolved in an etherous oil. One drawback of painting in D. is that it is difficult, owing to the rapidity with which the vehicle dries, to blend or graduate the tints. Yet in D. the painters of the early Cologne school developed a beautiful and glowing style of colour. The improved method of painting in oils invented by Van Eyck, about the middle of the 15th c., superseded D. for strictly pictorial arts, and since 1500 easel pictures have been painted almost exclusively in oils.

Distemper, a disease affecting young dogs, very much as infantile fevers affect children. It appears to be an inflammatory affection, often very acute in its earlier stages, and inducing in some dogs symptoms not unlike those of madness. The symptoms of D. are loss of spirits and appetite, dislike for exertion, dull eyes, and coldness of the body and limbs. The bowels are often evacuated spontaneously, discharges appear from the nose and eyes, and vomiting may occur. In some dogs the nervous

symptoms are greatly exaggerated, and exhibited in convulsive spasms; whilst as the disease progresses, the inflammatory action appears to extend down the respiratory passages, and to affect the bronchial tubes and lungs. The disease usually attacks dogs from the third to the sixth month of their age; but it also shows itself much later. D. appears to be contagious from one young dog to another, and to affect different kinds of dogs very variously. It tends to run a definite course, and the dog rarely or never suffers from a second attack. The treatment consists in giving from two to three grains of calomel daily as a purgative in milk; James's powders may also be given with advantage instead of the calomel. The food should be light but sufficient, and the eyes and head generally should often be bathed with lukewarm water, the animal being guarded from subsequent cold. Indeed he must be carefully tended from first to last, and be warmly housed, else the disease may leave permanent effects in the form of suppurating ears or other painful affections.

Distilla'tion (Fr. from Lat. *de*, and *stillatio*, 'a dropping'), is one of the oldest chemical processes, and was much in vogue with the alchemists.

The object of D. is to separate volatile from fixed substances, or volatile substances from one another. The principle of the process is simple. When heat is applied to a mixture of fixed and volatile substances, ebullition eventually takes place, and the volatile substances are gradually converted into vapour. If this vapour be caught and cooled, it will return to the liquid condition, whereas the fixed substances remain in the vessel in which the mixture was originally heated. Thus if sea-water be heated till it boils, steam is given off, and the steam if cooled yields pure water, whereas the saline ingredients present in the sea-water, being fixed substances, remain unvolatilised. Most ships intended for long voyages are fitted with the proper apparatus for distilling sea-water; and thus, if there be sufficient fuel, fresh water may be obtained at any moment. In the case of the separation of volatile substances from one another, advantage is taken of the fact that the most volatile body is the first to become vapour, so that if the first portion of vapour be cooled, the resulting liquid contains the greater part of the most volatile substance, whereas the liquid obtained by cooling the last portions of vapour contains most of the least volatile substance. This process of *fractional D.* will be explained more fully further on.

The apparatus in which D. is performed is called a *still*, and assumes various forms; but it consists essentially of two parts—a vessel in which the liquid to be distilled is heated (*body of the still*), and one in which the vapour is cooled (*condenser*). The

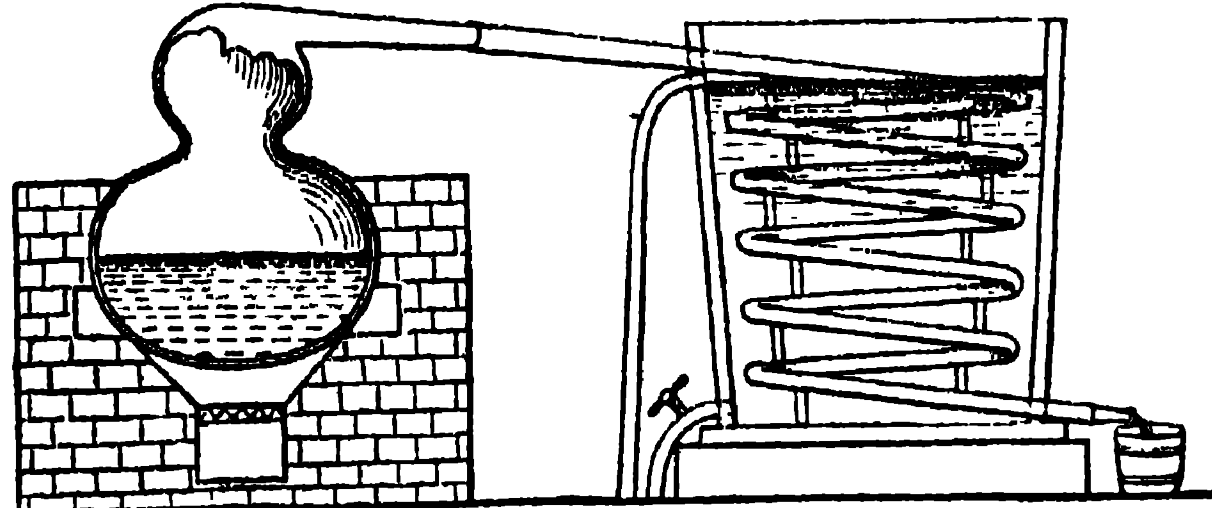


Fig. 1.—Worm-Condenser.

simplest form of the still is that in which the body of the still is a glass retort, and the condenser a flask immersed in cold water. The vapour arising from the liquid boiling in the retort passes into the flask, and there condenses to a liquid. But such an apparatus is inconvenient for distilling large quantities, because the water used in cooling soon grows warm (from the great amount of heat given out during the transformation of a vapour into a liquid), and must therefore be frequently changed, which disarranges the whole apparatus. To obviate this, use is made of the *worm-condenser* (Fig. 1), a coil of pipe immersed in a vessel through which a current of cold water is flowing. The cold water arrives by a tube attached to the bottom of the vessel, and escapes by a tube placed near the top. Another convenient form of condenser was invented by Liebig (Fig. 2). It consists of a narrow tube passing through a broad one, and fitted into the latter by means of corks. The broad tube is provided with two smaller branches, one at each end. Through the lower

with two smaller branches, one at each end. Through the lower
branch cold water is made to enter, and after traversing the whole length of the tube, flows out through the upper branch.

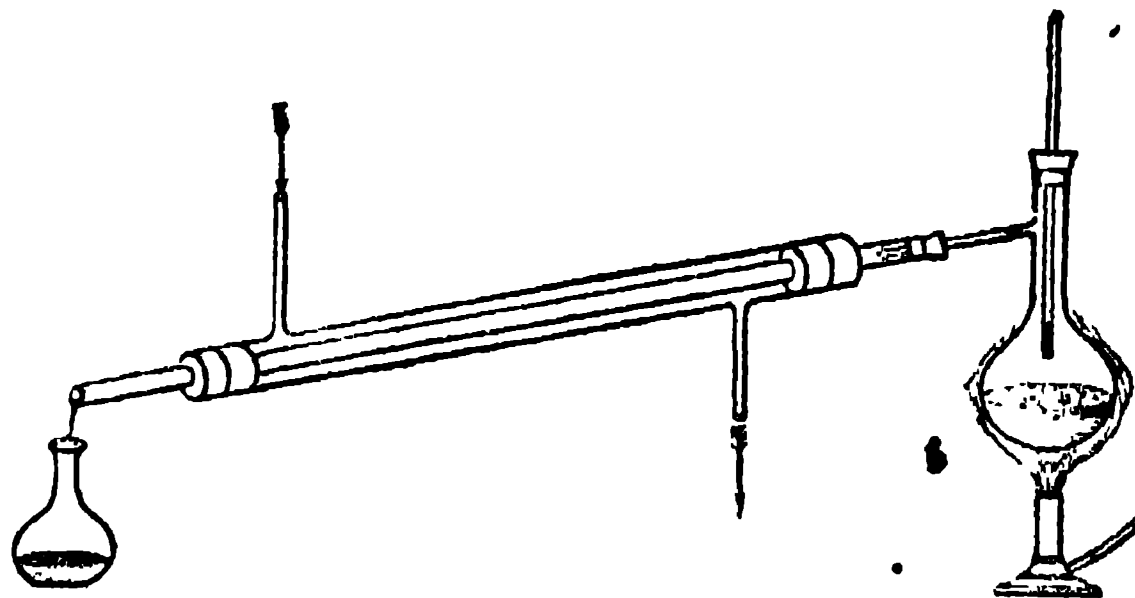


Fig. 2.—Liebig's Condenser.

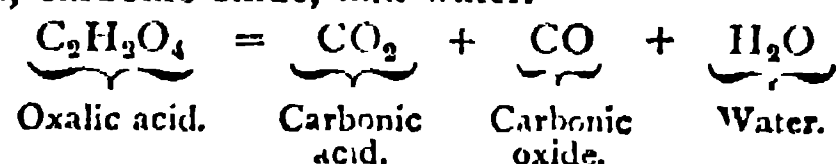
Thus the narrow tube (into which the vapour from the boiling liquid enters) is kept cold by a stream of water flowing over its external surface.

Fractional Distillation.—It was stated above that when a mixture of substances of different degrees of volatility is heated, the most volatile is the first to assume the state of vapour; so that, on distilling a mixture of volatile bodies, the most volatile passes over first, leaving the less volatile to follow. But complete separation by means of a single D. can only be effected when the temperatures at which the different bodies boil are widely removed from one another, and only then if the different liquids are not chemically allied. The first portions of the distilled liquid or *distillate* always contain the largest proportion of the most volatile body, and the latter portions least. On subjecting the first distillate or *fraction* to a redistillation, and collecting the first portions that pass over separately, they will be found to contain a still larger proportion of the most volatile substance, and on repeating the process for a greater or less number of times according to circumstances, the most volatile body can, in most cases, be completely isolated. In the same manner, by repeatedly rejecting the first portions of the distillate, and collecting the last, and by repetition of the process, the least volatile body may be obtained in a pure condition. In conducting a fractional distillation, a thermometer is immersed in the vapour of the boiling liquid, and throughout the process the temperature is carefully observed. As soon as ebullition commences the temperature is noted, and the distillation allowed to proceed till the thermometer marks a certain rise in the temperature of the vapour. The vessel into which the distilled liquid is flowing is now changed, and the distillation continued during a fresh interval of temperature. The vessel is again changed, and so on till the whole of the liquid, or as much as may be required, is distilled. The first fraction (*i.e.*, the liquid which comes over during the first period of the D.) is again distilled, collecting as before in separate vessels; and this process is repeated until the boiling-point of the first fraction remains constant—constancy in the temperature of a boiling liquid being a criterion of its purity. If it be desired to separate the liquid boiling at a higher temperature, the last fractions are similarly treated, except that the more volatile portions are set aside, the less volatile alone being redistilled.

Alcohol is rectified by fractional D. Pure alcohol boils at 78° C., water at 100° C. A mixture of the two will commence boiling at a temperature below 100° C., and the nearer to 78° C. the more alcohol it contains. In rectifying alcohol, the mixture of alcohol and water is distilled till the temperature of the vapour reaches 100° C. During this rise the whole of the alcohol passes over, and the residue in the retort is pure water. In tolerably dilute solutions all the alcohol has passed over when a third of the mixture has been distilled. The alcohol thus rectified still contains a considerable proportion of water. On submitting it to a second D., and collecting, as before, only those portions which boil below 100° C., it may be further purified. And on repeating the process finally, collecting only that portion boiling within 10° C. of 78° C., a very strong alcohol may be obtained, containing only 13 per cent. of water. Owing, however, to the great attraction of alcohol for water, it can never be completely freed from the latter by rectification alone.

The process of D. is of much practical importance. All kinds of spirits are prepared by its means from dilute solutions of alcohol. Coal-tar is separated into benzine (from which the aniline colours are manufactured), into oils for lubricating machinery, into heavier oils for preserving wood, and into a variety of other products. In the manufacture of perfumes from flowers, the latter are distilled with water, and the steam carries along with it their essential oil, which condenses along with the steam, and may be readily separated from the water.

Destructive Distillation.—There are many substances which, though not volatile in themselves, are nevertheless resolved by heat either partially or wholly into volatile products. If such substances be heated in a still, the volatile products, as fast as they are formed, pass into the condenser, and there assume the liquid condition. This is the process of destructive D. Wood is a substance which cannot be volatilised intact, but when heated suffers complete decomposition, and yields various volatile products, together with charcoal, which is a fixed substance. The destructive D. of wood is carried out on the large scale on account of the valuable substances contained in *wood-tar* (the volatile products arising from the operation), as well as on account of the charcoal. From wood-tar most if not all the acetic acid of commerce is prepared. It also contains wood-spirit or naphtha, creosote, paraffine, various hydrocarbons, &c. The process of gasmaking is another instance of destructive D. Coal is heated in iron or fireclay retorts; here it suffers decomposition, and is resolved into various volatile substances, and into coke (a compact form of charcoal). The coke, being a fixed substance, remains in the retort, whereas the volatile bodies pass off as vapour, and are made to traverse a considerable length of wide iron tube, cooled externally by the air. In this tube various liquid and solid bodies condense, forming a black viscid liquid called *coal-tar;* whereas the permanently gaseous products (gas) pass on unaffected, and after traversing various purifying apparatuses, at length enter the gasometer or store-chamber. The products of the destructive D. of substances are generally numerous and of a highly complex character, but this is not always the case. Thus if oxalic acid be distilled, it is resolved into carbonic acid, carbonic oxide, and water.



Distilled' Water. Spring-water contains various impurities, among which are salts of ammonia, lime, and magnesium. When it is distilled, these impurities remain behind, and pure water passes over. It is well to reject the first portions of the D. W., as they are apt to contain a little ammonia, and the last, as they may contain traces of hydrochloric acid. Where D. W. cannot be procured, rain-water may be substituted, for it is water distilled by the sun's heat. It is insipid, without odour, and is used for making many officinal preparations in medicine.

Distilled Waters are prepared by distilling water along with the parts of plants containing volatile oils, as lavender-water, peppermint-water, &c.

Distress', in English law, signifies the seizing of the personal effects of a debtor, and holding them as security for the debt, or selling them in payment of it. D. is now chiefly enforced by landlords against tenants for non-payment of rent. Executors may distrain on behalf of the testator before or after Probate (q. v.). A husband may distrain during his wife's life for arrears of rent of her land or houses accruing before or during marriage. All chattels found on the premises, whether the property of a tenant or a stranger, may be distrained; but dogs and wild animals, implements of trade, and other articles *in use*, are exempt from D. Nothing can be distrained which cannot be returned in as good a state as when taken. D. must be in proportion to the sum distrained for. See EJECTMENT, REPLEVY, and SALE. For Scotch law, see HYPOTHEC, SEQUESTRATION FOR RENT.

Distribu'tions, Statute of. The division of the personal property of those who die intestate in England is regulated by the 22 and 23 Car. II., called by this name. After payment of debts and funeral expenses, if the deceased leave a widow and children, one-third goes to the widow, and the other two-thirds in equal portions to the children; or, if any of the children be dead, to their issue in equal portions. If there be no children nor lineal descendants of children, one-half goes to the widow, and the residue to the nearest of kin of the deceased, or their representatives. If there be children but no widow, then the whole is divided among the children or their representatives. If a child has been portioned, the portion will be held as part of his share. An *heir-at-law* is entitled to his full share of the personal estate. If there is neither wife nor children living, nor representatives of deceased children, the whole property goes to the father of the deceased. If he has no father living, the whole goes to the mother, brethren, and sisters of the deceased in equal portions. If there are neither brothers nor sisters, the whole goes to the mother. If the mother be dead, the whole goes to the brothers and sisters and their children, failing all these, the whole goes to the grandfather or grandmother. After these, uncles, aunts, and nieces share equally. Failing all the above-mentioned relatives, the whole goes to the nearest of kin.

Dis'tricts, Mil'itary, certain divisions into which the country is marked off for purposes of efficiency in recruiting and organising the army. Prior to the passing of Mr Cardwell's Act in 1872 for localising the forces, England was divided into four districts, Scotland was one, and Ireland had five. (See BRIGADE, DEPOT.) Now there are in England nine general districts, each of which has headquarters as follows:—The northern, with Manchester as its headquarters; the eastern, with Colchester; the western, Devonport; southern, Portsmouth; the Chatham; the south-eastern, Dover; the home, the Horse Guards, London; the Woolwich; the Aldershot. Scotland is one general district, with headquarters at Edinburgh. Jersey is a military district; Guernsey and Alderney another. In Ireland, there are the Belfast district; the Dublin; the Cork; and the Curragh.

Ditch, in agriculture, a deep trench excavated along the sides of a field to serve as a main channel for the drain-water. In modern farming, ditches are frequently converted by the use of drain-tiling into covered sluices.

Ditch, in fortification, is the excavation in front of a parapet or rampart, and one of the chief defence-works. The earth taken from it supplies a parapet in field fortification, and the greater body of the material for a rampart in permanent works. It is kept dry, unless when actual danger is apprehended from without. The inner slope of the D. is the scarp; the outer, the counterscarp.

Dithyram'bus, a name of Bacchus, the origin of which is unknown, was a species of poetry invented by Arion, and cultivated by the Doric lyric writers, and afterwards at Athens. It was first used in honour of Bacchus, but afterwards also of other gods. It was elevated, but often bombastic in style, was accompanied by flutes, and gradually lost its regular choral or antistrophic character.

Dit'marsh, or **Dithmarch'en** (*i.e.*, the Deutsch or German marsh-lands), a fertile coast district in the W. of Holstein, between the estuaries of the Elbe and the Eider, has an area of 500 sq. miles, and a pop. of some 50,000. It has a flat coast, indented by a great bay, and its chief towns are Meldorf, Brunsbüttel, and Heide. In the time of Karl the Great, D. was ruled by Abbio, or Albion, the companion in arms of Wittekind, and became a province or *Gau* (*Thiatmaresgaho*) of the Frankish empire in 804. It formed part of the Markgrafdom of Stade, and later (1474) of the Duchy of Holstein, which had been granted in feoffment to Christian I. of Denmark in 1460. In 1500 D. revolted, and after a vigorous struggle under Wolf Isebrand, threw off the Danish yoke, and remained an independent state till Frederik II. again subdued it in 1559. The famous *Dithmarsisches Landbuch*, or legal Code of D., was drawn up by forty-eight judges in 1321, printed in 1497, revised in 1567, and imposed anew in 1711. See Joh. Adolfi, *Chronik des Landes D.* (2 vols., ed. by Dahlmann, Kiel, 1827); Michelsen, *Urkundenbuch zur Geschichte des Landes D.* (Altona, 1834); and a *Sammlung Altdithmarscher Rechtsquellen* (Altona, 1842).

Ditt'any (*Dictamnus*), a small genus of Rutaceous plants, natives of Southern Europe, Asia Minor, &c. *D. Fraxinella* and *D. albus* (common D., bastard D., or Fraxinella) have been long cultivated in gardens for the fragrance of their leaves and their handsome flowers. The inflorescence and the outer parts of the flowers themselves are covered with glands secreting a

resinous or oily volatile matter, which ignites with a flash in hot weather when the flowers are fading, if a light is applied to it. The white thick bitter root was at one time much used in medicine as a tonic, aromatic, stimulant, diuretic, antispasmodic, and emmenagogue. The D. of Crete is *Origanum Dictamnus*, a plant of another order. (See MARJORAM.) The name is also applied to *Cunila maranaia*, while *D. Fraxinella* is called bastard D.

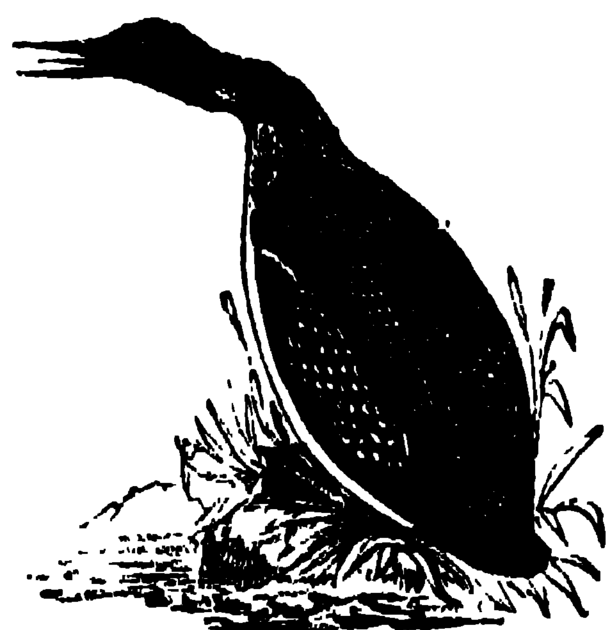
Dittelas'ma, a genus of *Sapindaceæ*. The berries of *D.* (*Sapindus*) *Rarak* of the Malay Peninsula and S. China have marked saponaceous properties, 'making a lather even with salt water; used as a lotion, they are useful in skin-diseases, and when eaten produce giddiness.'

Diu' (Sansk. *Dvipa*, 'an island'), a Portuguese island in the S. of the peninsula of Guzerat, Hindustan, at a short distance from the coast, has an area of two sq. miles, and a pop. of 11,000. It was famous in early times on account of the splendid temples of Mahadeva, destroyed by Mahmud of Ghizni in 1024. Seized by the Portuguese in 1515, it soon after became one of the most flourishing places of trade in India. The fortified town of D. lies at the E. end of the island, and is the seat of the Portuguese governor, who is subordinate to the Governor-general of Goa.

Diuret'ics are medicines which increase the quantity of the urine, chiefly by stimulating the kidneys. They are mostly given in dropsies. D. diminish the watery portion of the blood, and hence cause absorption of fluid from serous cavities and from the meshes of areolar tissues. Examples are the salts of potash, broom, foxglove, and juniper.

Divan', a word of very various signification. In Persian, *dîwân* means 'a book of many leaves,' 'an account-book,' 'a collection of books,' 'a senate or council.' In European languages it signifies a register, a muster-roll, a collection of poems, any administrative Turkish court, but especially a privy council or cabinet of the Sultan of Turkey. It also is applied to the room in which such a council sits—and hence to any room for the reception of distinguished guests—and to the low seats or cushions for their accommodation; for which reason the name D. is applied to a sort of sofa by the Western nations of Europe. The Turkish D. or State Chancellorship includes the greater number of the officials known under the name of *qualemié* or secretaries, and consists of five grades of officials, of which the highest grade corresponds with that of a general of division.

Di'ver, or **Loon** (*Colymbus*), a genus of Natatores (q. v.), or Swimming birds, belonging to the family Colymbidæ, and distinguished by the long, compressed bill with curved tip, by the short tail, the short tarsi, the three front toes being webbed, and the first and second quills being the longest in the wings. Of these birds, the Great Northern D. (*C. glacialis*) is the best known. It attains a length of 2½ or 3 feet, and is green, black, and purple above, with a white breast and abdomen. The neck and upper breast are banded with two black collars, and the black of the back is variegated with short white streaks. This bird is common on the N. coasts of Britain. The eggs number two, and are dark-brown; the nest is little more than a bare patch on the ground. The black-throated D. (*C. arcticus*) and the red-throated D. (*C. septentrionalis*) are two other British species. The former is marked boldly with black and white on the back; the latter is of smaller size, and has a reddish throat. The 'red-throated D.' is sometimes known as the Sprat loon; and the Great Northern D. as the loon and ember goose.



Great Northern Diver.

Diver'gent. See CONVERGENT.

Div'idend, in bankruptcy, is the share which a creditor ranked on the estate has in any fund falling to be divided. When a creditor has not been ranked in time to share in any declared D., if he prove his debt in time to share in a subsequent one, he is entitled to the arrear, which is called an *equalising D.* The term is also applied to the periodical (usually half-yearly) interest or profit arising from the public funds or from joint-stock undertakings.

Divid'ing En'gine. See GRADUATION.

Divi-Divi, the pods of *Cæsalpinia coriaria*, a great leguminous tree, a native of S. America. It is very rich in tannin, and is extensively imported for the use of tanners and dyers. D. is a strong astringent substance.

Divina'tion (Lat. *divinatio*), the presension or discovery of things future or hidden, by rites, omens, or other supernatural agency. The Latin term was used in a more restricted sense than the Greek (*mantikē*), which latter signifies the ascertaining of the will of heaven by any means whatever, whether through the mouth of the inspired seer or by the skill of the diviner. In all ages, and under all religious systems, the desire to penetrate the unrevealed and to know the future has prevailed in a greater or lesser degree. This yearning is rooted deeply in the human heart, and doubtless had its rise in the almost universal belief that gods and men had, at one time, met face to face. The belief that the gods care for man gave birth to another—that they sent indications of their will; hence it became the aim of mankind to interpret these manifestations. The Chaldeans had recourse to astrology, and tried to read the future by the aid of the stars. The Greeks, and after them the Romans—through Apollo, god of prophecy, and his inspired priesthood; through sacred books; by dreams and lots; by the flight, feeding, and chattering of birds; by the entrails of beasts; by placing straws on red-hot iron; by appearances in the heavens, such as comets, thunder, lightning, eclipses; and in countless other ways—strove to know the will of heaven. In the middle ages the same beliefs prevailed, and the already extensive catalogue of objects big with fate was increased. Even yet, D. flourishes in phases varying from the fortune-telling of the gipsy to that strange delusion spiritualism. The seeds of D. have become so rooted in our everyday life and conversation that they almost escape our notice, but reference to a few of them will suffice to prove not only their universality, but also their abiding influence. Such are the evil-eye, the sight of magpies, the number thirteen at table, the first-foot, the fact of stumbling, meeting a hare (the witch's steed), the fixing of the wedding-day, grouts in the tea-cup, the burning of nuts at Hallowe'en, spilling of salt, &c. Both in ancient and modern times omens have been drawn from sneezing, and nurses still exclaim when a child sneezes, 'Bless the child,' 'God bless it,' just as the ancient Greek cried *Zeu sōson!* 'Zeus save thee!' Many of the above-named modes of taking omens or reading the future were comparatively harmless, as they concerned the deluded inquirer only; but matters were much more serious when the diviner sought to ascertain the guilt or innocence of persons accused. Recourse was then had to an *ordeal*, and the individual was condemned or acquitted according as he stood the test imposed. The principal modes of D., which will be found under their proper heads, were Axinomancy, Belomancy, Bibliomancy, Botanomancy, Capnomancy, Cheiromancy, Coscinomancy, Crystallomancy, Geomancy, Hydromancy, Lithomancy, Oneiromancy, Pyromancy, Rabdomancy, Teraphim.

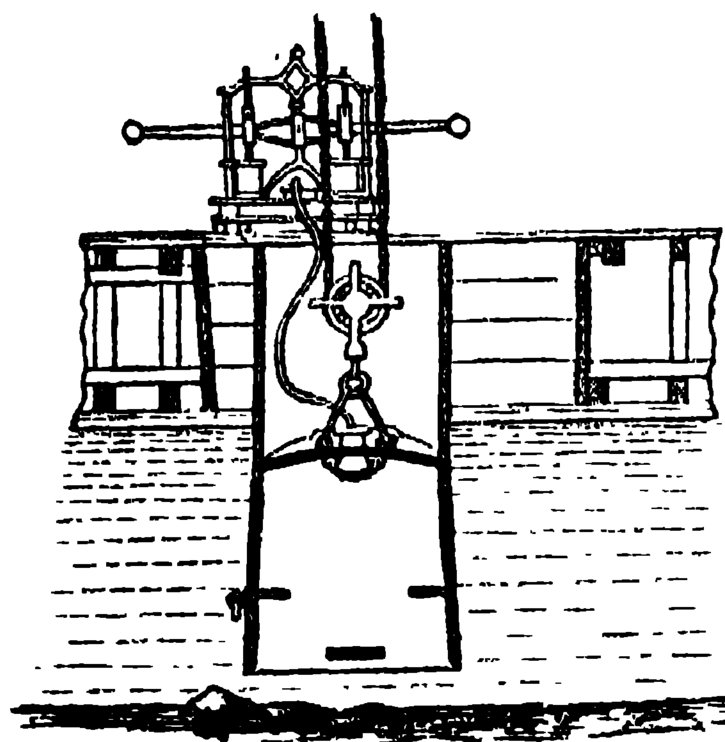
Divine Right. In former times the monarch was by a party regarded as the representative of the deity, and consequently as having no moral responsibility. Much learning has been shown in seeking to maintain or refute this view. That the king rules *jure divino* forms the groundwork of the learned and very abusive *Defensio Regia pro Carolo I.* of the learned Claudius Salmasius. He had for his opponent in the controversy the hardly less learned John Milton. The two great scholars abuse each other freely in classical Latin—*asinus* (ass), *pecus* (beast), and such-like terms being freely dealt between them. See the *Convocation Book* of 1603; Archbishop Leslie's *Power of the Prince*; Sherlock's *Case of Resistance to Supreme Powers* (1684); Mackenzie's *Jus Regium* (1683); for the modern High Church view, Dr Pusey's *Sermon on the 5th of November* (1837), and also Allen's *Royal Prerogative* (1849).

Divine Service, a tenure by which the tenant was bound to perform some special D. S. for the lord of the manor—as to sing so many masses.

Div'ing. See DIVING-DRESS, PEARL and SPONGE DIVING.

Diving-Bell, a vessel open at one end only, and of various shapes, which can be lowered into water with the open end downwards, and replenished with fresh air, so that men within it can breathe freely and work beneath the water. The earliest reliable account of anything resembling the modern D.-B. is a quotation by Gaspar Schott, a Jesuit priest, in 1664, from a book by John Taisnier. The passage describes how the latter, in 1538, saw two Greeks descend into the water in a large inverted 'kettle' suspended by ropes. After this time the D.-B. often engaged the attention of ingenious mechanicians, but it was Dr Halley, F.R.S., who, in 1720, proposed the changes which first rendered it really useful. The great difficulty in the way of its use was the want of adequate means of replenishing the air in it, so as to make it possible for men to remain in it for any considerable length of time. Dr Halley's principal invention was an arrangement by which barrels of air could be lowered to the men in the bell, and their contents allowed to pass into it, while the foul air could at the same time be discharged. In spite of the practicability of this plan, Halley's D.-B. does not seem to have been introduced into engineering operations. Smeaton (q. v.) was the first to employ the D.-B. for this purpose, and to him seems also to be due the first use of a force-pump to supply the bell with air. The first engineering work of any magnitude in which the D.-B. was employed was Ramsgate harbour (1788), for which Smeaton was the engineer. Since that time it has come into general use among engineers, and is constantly employed in the preparation of submerged foundations, the laying of masonry under water, &c.

The illustration shows the form of D.-B. commonly used, which differs very little from that of Smeaton. It is made of cast-iron, and is suspended by tackle from a boat or scaffolding. The upper part of it contains small panes of thick glass, which are sufficient in bright weather to give light to the men inside. The pipe from the air-pumps is connected with the top of the bell, and is fitted to a valve opening inwards. As the bell is gradually lowered, air is pumped into it to prevent the water rising to an inconvenient height as the air already in it becomes compressed. By continually adding air, the water is kept out of the bell. As soon as the bell has reached the required position, the workmen signal to stop lowering. Signals for various purposes can be given, according to a preconcerted code. Air-pumps are contantly at work while the bell is under water, the used-up air continually escaping under its lower edge, and coming to the surface in bubbles. The pressure of the air in the bell depends upon the depth to which it is immersed. It seldom exceeds double the atmospheric pressure, which corresponds to a depth of between 30 and 40 feet. Breathing in such a dense atmosphere causes considerable discomfort to those unaccustomed to it, but no permanent ill effects to the workmen. The greatest depth under water at which work has been done is about 120 feet. This was reached in the foundation of the St Louis Bridge, for making which an air-tight caisson (similar in principle to a D.-B.) was employed. The pressure here was more than four times as great as that of the atmosphere, and the men could remain in the caisson only about twenty minutes at a time.



Diving-Bell.

Diving-Dress, a watertight dress, including a helmet, so arranged that its wearer can move freely under water. Some kind of dress which answers this purpose more or less imperfectly has been long known, but only within the last few years has it been brought into a really practicable form. The dress is of india-rubber cloth, and the helmet of metal, the latter having plates of glass opposite the eyes, and a nozzle for the attachment of the air-pipe. The diver has lead weights on his chest and back, and descends into the water by a rope-ladder from a boat or wharf. He can give signals by means of a cord, and can remain submerged for five or six hours. The employment of divers in a dress instead of a diving-bell is now very common. Not only would it often be very inconvenient to fit up the necessary apparatus for the heavy bell, but often also the work can be done more satisfactorily by divers than by workmen who cannot get beyond a very confined space.

Divin'ing Rod, a forked branch, usually of hazel, formerly believed to have the power of indicating a treasure, mineral vein, a spring of water, &c., by bending towards the thing sought. In modern practice the diviner is placed in contact with a metallic or other magnetic substance. The art is still practised in Italy and the S. of France, under the names of *metalloscopy* or *hydroscopy*, according as the object sought is a metallic vein or a spring of water. Men of science have professed their belief in the D. R., though some of these are not clear as to the cause of its influence. Bayle's *Dictionary*, in the notes to the article 'Abaris,' contains some interesting facts bearing on the subject. See also De Quincey on *Sortilege*.

Divir'igi, a town in the vilayet of Sivas, Asia Minor, on the Tshalta, a tributary of the W. branch of the Euphrates, 23 miles W.S.W. of Egin. It is situated in a hilly region, is elevated about 1000 feet above the sea, has some trade in fruits, and is to form a station on the projected railway to Ersingjan. Pop. 10,000. D. was the ancient *Tephrene*.

Divisibil'ity, the property which all matter possesses of being separated into parts. To what extent the process may be carried on is a matter of speculation, the general belief being at the present time, however, that matter is ultimately composed of indivisible particles called atoms. (See ATOM.) There are some very striking examples in physics of this general property. Gold-leaf has been obtained of a transparent thinness; and a film of the same metal can be formed not exceeding the ten-millionth of an inch. A single grain of blue vitriol tints five gallons of water. A musk grain that has perfumed a room for years shows no diminution in its weight. The animal kingdom gives many examples of extreme attenuation of matter.

Divi'sion, a fundamental rule of arithmetic, which gives the method of finding the number of times one figure contains another. The number to be divided is the *dividend*, that which divides is the *divisor*, and the result of the operation is the *quotient*. When the dividend contains the divisor an exact number of times, the former is said to be *divisible* by the latter. The distinctive symbol of D. is $\div$; thus $a \div b$ means the operation of dividing a by b. The same thing is far more frequently expressed, especially in algebra, by the fractional form, namely, $\frac{a}{b}$. The usual methods of D. are to be found in any treatise on arithmetic or algebra.

Division, Military, a section of an army, commanded by a general, usually consisting of two, and sometimes of three, brigades (see BRIGADE), and embracing infantry, cavalry, and artillery. The number of divisions in an army varies according to the number of men in the field or the scale of a war.

Division, Naval, was a secondary section of a fleet, forming a third part of a squadron, of which there were usually three in the most complete English fleets. The term is now practically abolished since the adoption of iron-clad and heavily-armed steamers.

Division of Labour is of two kinds: 1st, simple co-operation, which may be illustrated by the case of two greyhounds running together and killing more hares than four greyhounds running separately; or by the case of sawing timber, rowing a large boat, &c.; 2d, complex co-operation, where 'one body of men having combined their labour to raise more food than they require, another body of men are induced to combine their labour for the purpose of producing more clothes than they require,' to be exchanged against the surplus food (Wakefield's Notes to Adam Smith). Such is the geometrical definition of political economy, but in reality the growth of D. of L. is much more natural, more complex, and less conscious, and is modified at every stage by the positive institutions of society, such as slavery, castes, craft guilds, trades' unions, &c. The production of a coat nowadays requires the following trades:—Sheep-breeder, sheep-feeder, wool-dresser, wool-spinner, weaver, dyer,

and tailor, without counting the carriers, wholesale merchants, factors, &c., who act as middlemen between different classes of manufacturers. All these persons require to be provided with food, lodging, fuel, and clothing; hence, within limits, it may be said that the existence of one important branch of industry requires the existence of all others. Hence, not only does D. of L. increase the *quantity* of production, it renders *possible* a great many *kinds* of production. It has been said that no country has a productive agriculture unless it has a large town population or an export trade to supply. The increase of skill, the saving of time, and the saving of material sufficiently explain how D. of L. increases the quantity of production. M. Say mentions that there are 70 operations in cardmaking; M. Babbage that there are 102 in watchmaking; and yet the products of these numerous operations are sold very cheaply. Many great mechanical improvements have also been suggested by the attention of individual workmen being concentrated on single processes. The D. of L. is at all times necessarily limited by the market for the article, and by the nature of the employment. Whether production can be carried on most efficiently on a large scale is, therefore, a question depending not merely on theoretical advantages of D. of L., but also on such circumstances as the extent of population, the means of communication, the realised wealth of the community, &c.

Divorce'. Previous to the Divorce and Matrimonial Act, a marriage could only be dissolved in England by an Act of Parliament. At that time, an apparent marriage might be declared null on the ground of Degree of Kindred (q. v.), or Bigamy (q. v.), and on some other grounds; but the effect of the legal declaration was to establish the fact that marriage had never existed. D. of course presumes the existence of marriage. Under the Act referred to, a husband may obtain D. on the ground of his wife's adultery. A wife may D. her husband on the ground of incestuous adultery and of some other gross offences. Condonation (q. v.) or Collusion (q. v.) bars D. Desertion, however long, is not sufficient ground for D. unless accompanied with adultery. (See DESERTION OF SPOUSE, JUDICIAL SEPARATION.) After D. husband or wife may marry again, even with the paramour.

By the law of Scotland, D. may be had on the ground of adultery, or of wilful desertion for four continuous years. But neither of these grounds dissolves the marriage *ipso jure*. The offender forfeits all pecuniary benefit which might otherwise accrue to him or her from the marriage. Condonation or collusion also bars D. in Scotland. Recrimination does not; but as common guilt may affect the pecuniary interests of parties, it may be alleged in a counter-action.

Divorce and Matrimonial Causes Court.—This court is constituted under the Acts of 1857 and 1858. In it is vested all authority in suits of divorce, separation (see JUDICIAL SEPARATION), nullity of marriage, and restitution of conjugal rights. It has jurisdiction in all matrimonial matters except marriage licences. The full court consists of the Lord Chancellor, the judges of the superior courts at Westminster, and the judge of the Probate Court, who is judge in ordinary. Either party to a suit may appeal against the decision of the judge sitting alone to a full court within fourteen days. Sittings of the full court are held during the seventh and five following days of sitting in each term, and on such other days as the judges think proper. Either party to a suit for dissolution or declaration of nullity of marriage may, within one calendar month, appeal against the decision of a full court to the House of Lords, if sitting, or if not sitting, within fourteen days after its meeting.

Dix'on's Entrance, off the Pacific coast of N. America, is the strait between Prince of Wales and Queen Charlotte Islands, and an inlet receiving the Simpson River. It is about 100 miles long from W. to E., and partly separates British Columbia from Alaska.

Dixon, William Hepworth, an English author, descended from an old Puritan family, was born at Newton Heath, in the West Riding of Yorkshire, June 30, 1821. After being for a short time in a Manchester mercantile house he took to literature, and settled in London in 1846, where he was called to the bar in 1854. He first attracted attention by his *John Howard and the Prison World of Europe* (1849), and two series of essays *On the Literature of the Lower Orders* and *On London Prisons*, originally published in the *Daily News*. D. now devoted himself almost entirely to historical and biographical works, publishing a biography of William Penn (1851), which obtained notoriety from its answer to the charges made against the great Quaker by Macaulay, a *Life of Robert Blake* (1852), *The Personal History of Lord Bacon* (1860), *Her Majesty's Tower* (1871), the *History of Two Queens* (1873–74), and *Royal Windsor* (1878–79); besides *New America* (1867), *Spiritual Wives* (1868), *Free Russia* (1870), *The Switzers* (1872), *White Conquest* (1875), and two novels, *Diana, Lady Lyle* (1877), and *Ruby Gray* (1878). Editor of the *Athenæum* from 1853 to 1859, and a Middlesex magistrate from 1869, D. died in London, December 27, 1879. His style is picturesque, epigrammatic, and racy, but is marred by a certain vulgar assurance, which is distasteful to scholars.

Dizful', the chief trading town of Khuzistan, Persia, on a river of the same name, at the foot of a range of hills, 36 miles N.W. of Shustar. It has an inferior bazaar, but it furnishes good supplies of victuals, and has a fine climate. To the N.W. of D. the river is crossed by an old stone bridge of twenty arches. Pop. 20,000.

Diz'ier, St, a flourishing town in the department Haute-Marne, France, on the river Marne, 30 miles S.E. by N. of Chalons-sur-Marne by railway. It has a theological school, a chamber of commerce, a new townhall, and the ruins of an old castle. Its main industries are iron-smelting, cotton-spinning, and barge-building, and it has also an active trade in cabinet woods, grain, millstones, &c. Pop. (1872) 8167. In the middle ages D. was called *St Desiderii*, from being the last resting-place of Bishop Desiderius of Langres. It was long an important fortress, and in 1544 resisted for six weeks the army of Charles V. of Spain, its capitulation only being brought about eventually by the governor's treachery. On 25th January 1814 the Russian general Prince Tscherbatov fought the French at D., and drove them back on Vitry, but two days later Milhaud recovered the town from Prince Lanskoi. The Prussians on the 30th January displaced Lagrange's division, and held D. till the 26th March following, when the French under Marshal Oudinot stormed and recovered it once more.

Djez'zar ('the Butcher'), the surname of an adventurer named Achmed, born in Bosnia about 1735, came into the hands of a slave-dealer in Constantinople, was bought at Cairo by Ali-Bey, and earned his surname and the affectionate regard of his master by the facility with which he got rid of all persons obnoxious at court. In 1775 he was appointed Pacha of Acre. He exercised a commercial monopoly here, and extorted arbitrary impositions from a community of French merchants who had settled at Acre. Eventually he expelled the French consul and merchants, and sacked the consulate. This insult to the French flag was one of the considerations which determined Napoleon's expedition into Syria. On the 20th March 1799 Napoleon opened the siege of Acre, but so obstinate was D.'s defence, that after attempting for two months to reduce the town, the French were obliged to retire. D., though a monster of cruelty, was possessed of great military and administrative capacity. He died in 1804.

Dmitrov' ('the town of St Demetrius'), a town in the government of Moscow, Russia, on the Jakhroma, 40 miles N. of Moscow, with silk and woollen manufactures, tanneries, and a trade in linen, wax, and tallow. Pop. (1869) 7529.

Dnie'per (Gr. *Borysthenes Danapris*, Turk. *Ohu*, Tartar, *Exi*), after the Volga and Danube the largest river of Europe, rises among forest marshes in the government of Smolensk. Its general direction is S., but in its lower course it sweeps first to the S.E. and then to the S.W. and W., and after a course of more than 1000 miles falls into the Black Sea below Kherson, its embouchure (*Liman*) forming a gulf on the W. side of which lies Odessa. In its mouth there is an archipelago of forty islands, on several of which there are forts. It is navigable nearly its whole length, the impediments produced by the numerous sandbanks and rapids in its lower course below Ekaterinoslav having been partly removed by blasting, and partly overcome by hydraulic works constructed at the expense of the state. Annually it is frozen for from 80 to 97 days. Its affluents from the E. are the Soj and the Desna, from the W. the Pripet and the Beresina. The D. traverses some of the finest governments of the empire—Mohilev, Minsk, Kijev, Poltava, Ekaterinoslav, and Taurida—and conveys their products to the Black Sea.

There is also some trade with the Baltic by canal communication between the D. and the Beresina and Dwina. At the mouth of the D. are valuable fisheries of sturgeon, herring, carp, &c.

Dnie'ster (anc. *Tyras, Taras, Danasterrus*, Turk. *Tur*), a river of Europe, rises on the N. of the Carpathians, in Austrian Galicia, but is mostly in Russia. It enters the Black Sea 30 miles S. of Odessa, after receiving thirty-seven affluents, and after a course of upwards of 500 miles. The navigation, which is almost wholly downwards, is chiefly occupied with the transport of wood, grain, salt, &c. Mud flats and sandbanks obstruct the mouth of the river.

Do'ab (Sansk. 'two rivers;' comp. Lat. *duæ aquæ*) is the name given to the long, narrow strip of country in India, N.W. Province, lying between the Jumna and the Ganges, and stretching from Allahabad to the Himalayas. It includes the divisions of Mirat, Agra, and part of Allahabad, and is in great part extremely fertile.' But the name is also applied generally in Northern India to any similar region. The Punjab, for instance, is subdivided into a number of Doabs.

Dobell', Sydney, an English poet, was born 5th April 1825, at Cranbrook, in Kent. His youth was painfully precocious. Married in 1844 to one of the sweetest and truest women in England, he first came before the public in 1850 with the *Roman*, an impassioned dramatic poem, warmly espousing the cause of Italian freedom. After traveling in Switzerland he resided in Edinburgh until 1857, when he removed to Cheltenham and the Isle of Wight. He published *Balder*, a fervid, gloomy, and pathetic poem, in 1854; *Sonnets on the War*, written along with Alexander Smith, in 1853; and *England in Time of War*, a collection of exquisitely musical, touching lyrics, in 1856. In 1865 he produced a pamphlet on *Parliamentary Reform*, in which, like Hare and Mill, he advocated a 'graduated suffrage.' Bad health hindered his literary activity during his later years. His *England's Day* (1871) is a defiant lyric against Grant, Bismarck, and Gortschakoff. D. died November 14, 1874. In analytic subtlety he at times rivals Browning; his melody of verse is almost equal to Shelley's. His notes and memoranda were published as *Thoughts on Art, Philosophy, and Religion* in 1876, with a prefatory note by Professor Nichol. See also Nichol, *Poetical Works of D.* (1875), and *The Life and Letters of S. D. Edited by E. J.* (Lond. 1878).

Dö'beln, a town of Saxony, on an island formed by the Mulde and Muhlgraben, 36 miles S.E of Leipsic by the Mulde and Chemnitz Railway. It has manufactures of linens, woollens, brassware, &c., also bleachfields and worsted mills, a trade in butter, and important cattle and horse fairs. Pop. (1871) 10,078.

Dobrow'ski, Joseph, a Bohemian philologist, born at Gyermet, Hungary, 17th August 1753, studied at Deutschbrot, where he acquired the Bohemian language, that of his childhood having been German. He afterwards studied at Klattau and Prague. In 1774, on the dissolution of the Order of Jesuits, to which he had attached himself, he withdrew to Prague, where he published his first work, *Fragmentum Pragense Evangelii S. Marci, vulgo autographi* (1778). From 1780 to 1787 he edited at Prague a journal of Bohemian and Moravian literature. From 1792 to 1795 he visited Denmark, Sweden, Russia, Italy, Germany, and Switzerland in search of MSS. illustrative of Bohemian history. After his return he exhibited symptoms of mental derangement, which, in 1801, necessitated his removal to an asylum. Recovering his reason in 1803, he lived sometimes at Prague and sometimes in the country. He died at Brunn, 6th January 1829. D.'s principal works are *Scriptores Rerum Bohemicarum* (2 vols. Prag. 1783-84), in which he had Pelzel for a collaborateur; *Geschichte der Böhm. Sprache und ältern Literatur* (Prag. 1792); *Die Bildsamkeit der Slav. Sprache* (Prag. 1799); *Deutsch-Böhm. Worterbuch* (Prag. 1802-21), in preparing which he was assisted by Leschka, Puchmayer, and Hanka; and *Institutiones Linguæ Slavonicæ Dialecti Veteris* (Vienna, 1822); &c. See Palacky, *Jos. D.'s Leben und gelehrtes Wirken* (Prag. 1833).

Dobrud'scha, the ancient Scythia Minor, since 1878 part of Rumania, is bounded N. and W. by the Danube, E. by the Black Sea, and S. by a line drawn from Mangalia to near Silistria. It was the scene of numerous important operations during the Turko-Russian wars of 1854 and 1877.

Doce'tæ, heretics in the early Christian Church who held that the body of Jesus Christ was nothing but a phantom or appearance (Gr. *dokēsis*, hence the name), or that, if substantial, it was of a celestial substance. The heresy, which is supposed to be referred to in several passages of the New Testament, and the foundation of which is ascribed to Simon Magus, to Cassian, and to Tatian, was founded on the dualistic notion of the essentially evil nature of matter, so that the divine nature could not be supposed to unite itself with a material body and thereby expose itself to the pollution from which it was the object of Christ to free mankind, combined with the other favourite Oriental notion that a higher spirit has the faculty of presenting itself to the eye in various sensible but unsubstantial forms. See Neander's *Kirchengeschichte* and Blunt's *Dictionary of Sects*, &c.

Dock, an excavated enclosure, usually provided with gates, formed in connection with a river or harbour for the reception of ships. Docks are of two kinds, *wet* and *dry*. A wet D. is a basin in which the water is maintained at a uniform level by shutting the gates before the ebb of the tide, for facilitating the loading or unloading of vessels lying at the quays or jetties. A dry D. or *graving* D., for repairing the exteriors of ships, is a long and narrow excavated basin with curved ends, lined with masonry, and left dry by the ebbing of the tide, or rendered so by pumping. A ship is floated in at high water, and is steadied in a vertical position by means of 'shores' and wedges. At low water the entrance is closed, and the remaining water pumped out. When the repairs are completed, the water is again admitted, and the vessel floated out. The walls of a dry D. slope inwards towards the bottom, and all round steps or 'altars' are constructed to allow of ready access to all parts, and also to serve as supports for the shores which hold the vessel upright. An inverted arch of masonry is usually constructed as a foundation for D. walls, which are thickest at their base, and are puddled with clay behind the granite or concrete facing, so as to be perfectly watertight. Cast iron has been used for the walls at the entrance to the Victoria (London) Docks, the iron plates being backed with concrete and coped with granite. As a protection from abrasion, fenders of timber are often secured to the faces of D. walls.

Gates or *caissons* are fitted at the entrance to docks, to shut out or keep in the tide. Small gates are formed of wood, large ones of wrought iron. The gates of the new South Docks at the Isle of Dogs, in the Thames, are of the latter material, and are cellular, having two skins separated by horizontal and vertical ribs. Gates are usually in two parts, and the inner and outer upright posts, called the heel and mitre-posts, are generally of greenheart timber. Each leaf swings on pivots, working in sockets of gun-metal or chilled cast iron, and is supported at the mitre-post on a roller which runs on a curved iron pathway. The sides of the gates are curved outwards, so as to resist better the pressure of the water. Caissons, ship-like in form, with stem and stern projections to fit into grooves in the masonry, are found convenient for closing D. entrances. They are built of wrought iron, and are divided into compartments, with apertures for the admission of water. To close a D. entrance, the caisson is floated into its proper position, and water being admitted to some of the compartments, it sinks down into the stone recesses; by pumping the water out, the caisson is readily removed. A shutting sill of timber is embedded in the masonry at the bottom of a D. entrance, and against it the base of the gates or keel of the caisson presses closely, preventing the passage of water.

In recent docks, gates are opened and shut by hydraulic machinery, a power which is now used for emptying graving docks, and working the swing-bridges, capstans, cranes, and other D. conveniences. To further the performance of business, every facility is provided in docks. There are all kinds of hoisting apparatus and mooring-posts; rails are laid along the quays having connection with the great railway systems; extensive warehouses and cellarage for the storage of goods, jetties to accommodate vessels of considerable draught, &c.

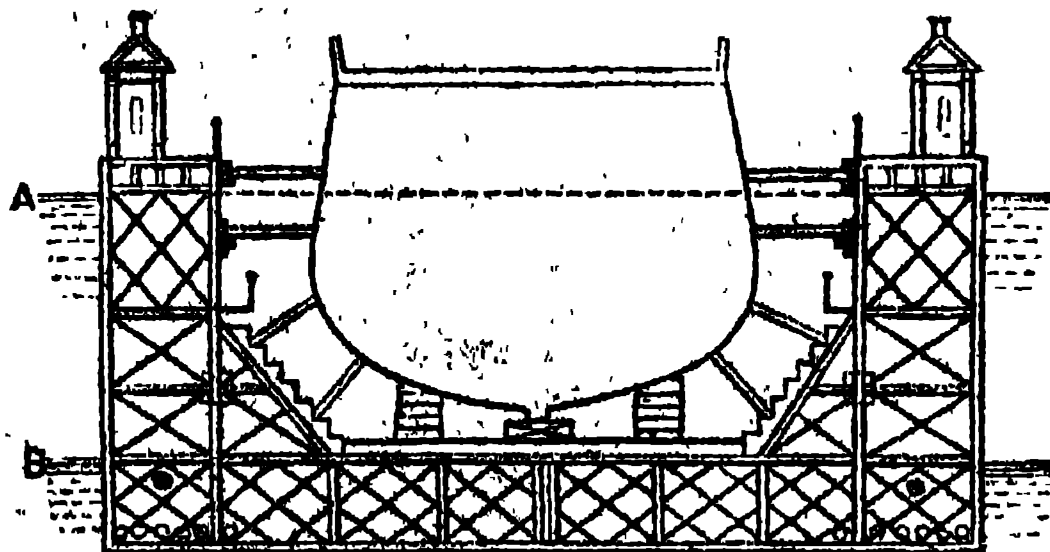
Sluicing is frequently resorted to to clean wet docks of the mud that is constantly being deposited. The docks being allowed to run dry, the mud is thrown into deep channels, and carried away by the scouring water that has meanwhile been admitted into them from sluices.

The docks of Great Britain surpass in extent those of any other country. The most remarkable examples are to be

found on the Thames and the Mersey. The docks on the E. of London are seven in number, in area between [illegible] and 800 acres, and comprise the Commercial Docks, Surrey Docks, East India Docks, West India Docks, St Katherine's Docks, London Docks, and Victoria Docks. The total area of the Liverpool and Birkenhead docks and basins, irrespective of graving docks, amounts to [illegible] acres, with a wall quay-face 28 miles long. The graving docks number eighteen, having an aggregate length of floor of upwards of two miles; the Herculaneum graving docks are the largest and the most recent, the floor of each being 750 feet long. There are also important docks of both kinds at Bristol, Hull, Southampton, Sunderland, Shields, Leith, Dundee, &c.

Other Arrangements for affording Access to Ships' Exteriors.—In past times *beaching* and *careening* were resorted to. In the former operation the vessel was run on to the beach, so that it was left high and dry by the ebb of the tide; in the latter, it was heaved over first on one side and afterwards on the other, so that the keel was raised out of the water, by means of power applied to the masts, which were properly strengthened for the great strain. In some situations a *slip* or inclined plane, with wheels and hydraulic machinery for dragging a vessel out of the water is adopted. (See SLIP.) In America vessels are raised out of the water by means of a *screw D.*, or timber frame raised or lowered by means of screws and other machinery.

Floating Docks.—In localities where the construction of graving docks would be enormously expensive, a most convenient



TRANSVERSE SECTION OF RENNIE'S FLOATING DOCK.

A, Level of water preparing to receive first-class ship.
B, Level of water with first-class ship docked.

substitute is found in a floating D., which has the advantage of being independent of the tide. In the United States timber structures of this nature have been in use for many years. In Great Britain iron has been recently employed in their construction. The Spanish port of Ferrol, on the Atlantic, possesses a floating D., made after the designs of Mr G. B. Rennie, wholly constructed of plate, angle, and T-iron riveted together. It resembles an oblong rectangular box without top or ends, and measures 350 feet long, 105 broad, and 37½ high from the floor of the D. The base or pontoon and side walls are hollow, and divided into watertight compartments, strengthened by open lattice girders and diagonal bracing, which give the structure great rigidity. The upper chambers in the side walls are air-tight, and keep the D. from sinking too low when water is admitted by sluices and distributed by pipes through the lower chambers. When the D. is sufficiently submerged, the sluices are closed, and the vessel to be docked is drawn in between the side walls. The water in the chambers being then pumped out, the D. rises gradually, lifting the vessel, which is steadied with the usual appliances, completely out of the water, as shown in the foregoing figure. The displacement of water by the base equals 13,000 tons, and deducting the weight of the D. itself, 5000 tons, a sustaining or lifting power of 8000 tons remains. An iron floating D. of different construction was launched at North Woolwich in 1868, and towed in the following year to Bermuda, where it has successfully docked first-class men-of-war. It is U-shaped in section; the double sides and bottom, 20 feet apart, are divided into compartments, and a caisson is fitted at each end. To dock a vessel, some of the compartments are filled with water to sink the D. sufficiently, and then water is admitted into the inside by valves in the caissons, till the sea outside and inside has the same level. The caissons are next taken out, and the ship led in over the central line of blocks. The D. is afterwards raised about 10 feet by partly emptying the chambers, the caissons are placed in position, and the water remaining inside the D. is run into the side balance-chambers, leaving the vessel dry. To undock the vessel, the side chambers are filled up, and water let into the inside of the D. by the openings in the caissons, which are then removed and the ship led out. Pontoons capable of supporting small vessels may be used in connection with this D. The Bermuda floating D. affords facility for the examination of its own base, by filling the upper chambers of one side with water.

Hydraulic Lift Dock.—This is another ingenious contrivance for the dry-docking of vessels. One of them may be seen at work at the Victoria Docks, London. On two parallel sides of a channel 300 feet long and 60 feet broad, sixteen upright cast-iron columns, in a row, are sunk into the ground. At the base of each column there is an hydraulic press, and the top of each piston or ram carries a cross-head, from the ends of which two iron girders are suspended by iron bars. These girders extend across the excavation to the cross-head of the corresponding column on the opposite side. There are thus thirty-two girders forming a kind of platform capable of being raised or lowered. On this platform rests a wrought-iron pontoon, open at the top, having sufficient buoyancy to support a vessel. To apply the apparatus, the girders and pontoon, weighted with water, are sunk to the bottom of the lift, and the vessel to be raised is drawn in directly over the centre of the pontoon. The rams are then slowly raised by hydraulic power, the vessel being at the same time secured by wedges and blocks. When out of the water, the pontoon is emptied by valves which are afterwards closed. The girders being again lowered, the pontoon, with the vessel upon it, remains afloat, and may be towed to a convenient spot. As many vessels as there are pontoons can be docked in a similar manner.

Dock (*Lapathum*) a sub-genus of *Rumex* (see SORREL), containing those plants which are not acid, and the flowers of which are almost invariably hermaphrodite. Most of them are troublesome weeds, though they may grow in watery places. The roots of the great water-D. (*R. hydrolapathum*) are administered as an antiscorbutic, and were looked upon by the Druids with superstition. The roots of other species are also astringent, and can be employed medicinally in rheumatism as styptics, as astringent gargles, or as a dentifrice. Monk's rhubarb (*R. alpinus*) has been employed in place of true rhubarb, but is not so powerful. The roots of D. have also been employed in dyeing. In all, there are eleven British species of D.

Dock'et, in English law, is a record in the courts containing an entry of judgment. *Striking a D.* is when a creditor gives a bond to the Lord Chancellor to prove his debtor to be a bankrupt. See DOQUET.

Dock'ing Horses. When young work-horses are sent to grass, they are docked, *i.e.*, six joints of their tails are amputated, the object being to keep the naturally long tails from being incommoded in the trams of a cart. The cutting is accomplished by aid of a machine similar in form to a pair of nutcrackers.

Dock Warrant. When goods are consigned in a Bonded Warehouse (q. v.), a certificate is granted called a D. W. When a transfer is made, the warrant is endorsed with an order to deliver to the purchaser. An entry in the warehouse books completes the transference. When a D. W. is lost, a new one will only be granted on security of indemnification to the company should loss arise in consequence.

Dock'yard, a naval arsenal for the construction, repairs, and equipment of ships. A D. usually embraces building slips, repairing docks and basins, workshops, and all the machinery and tools necessary for the manufacture of anchors, cables, and other adjuncts of a ship and storehouses. The royal dockyards in Great Britain are at Portsmouth, Devonport (Plymouth), Chatham, Sheerness, and Pembroke. Woolwich and Deptford dockyards were closed in 1869. Early in this century the English dockyards were in a very backward condition; now they are unequalled for completeness.

Dockyard and Naval Stations.—The Harbour Regulation Act provides for the security of the ports, harbours, and navigable rivers of the United Kingdom. It regulates the mooring and placing of private ships, restricts the keeping of gunpowder on board ship, &c.

Doc'tor (from Lat. *doceo*, 'I teach'), a title at first bestowed on one who could teach a special art or science, but now applied to one who has taken the highest degree in law, divinity, physic, or music. The title was probably first sanctioned at Bologna University about the middle of the 12th c., where Inerius or Werner, Professor of Roman law, is said to have induced the Emperor Lothar II. to introduce the dignity. The title then passed into the faculty of divinity—Peter Lombard, Bishop of Paris, being made D. of divinity by the Paris University in the middle of the 12th c. The first D. of medicine was Gulielmo Gordenio, of Asti College, elected *D. artium ex medicina* in 1329. The title was not introduced into the English universities until the reign of John or of Henry III. See DEGREE.

Doctors' Commons is the college of civilians in London founded by Dr Harvey, the Dean of Arches, in 1568, for the professors of the civil law. In it were situated, prior to the transfer of the ecclesiastical jurisdiction and the opening of the Probate and Divorce Courts in Westminster, the residences of the judges of the spiritual and admiralty courts. It was also the abode of the doctors of the civil law practising in London, who for diet and lodging commoned together; hence the name of D. C. To the college belonged a certain number of advocates and proctors. The Court of Arches, which is the chief ecclesiastical court of the province of Canterbury, and the Admiralty Court, still remain in the once-renowned D. C.

Doc'trinaire means, in the first place, a secular priest or clerk of the Christian doctrine. In this sense it has been displaced in the French language by *religionnaire*. Under the Bourbon Restoration it was applied to a set of political men, who professed to deduce their ideas, half liberal half conservative, from a coherent body of political theory. This fraction of the Chamber existed in 1816, when the name was first applied to Royer-Collard by the *Nain Jaune Réfugié*, a French newspaper published at Brussels. M. Cousin and the Duc de Broglie were also leading Doctrinaires. But their representative man was Guizot, who in 1822, by an *Essay on the Origin and Development of the English Constitution*, revived that excessive admiration of *de facto* legitimacy which Montesquieu and De Lolme had already evinced for the English Constitution. He endeavoured to construct a political eclecticism on the ruins of Boulainvilliers the feudalist, Dubos the monarchist, De Mably the democrat, and Demaistre the theocrat. Practically the Doctrinaires were for extension of the *Charte* of Louis XVIII., and, therefore, opposed the absolutism of Charles X. Under Louis Philippe, however, most of them, now beyond middle age, were unable to move with the times; and it has been said that the Doctrinairism of M. Guizot, when in power, was sufficient to excuse the Revolution of 1848. Hence D. is sometimes used to denote an unpractical pedant—in vulgar language, a political prig. In England the term was applied to Bentham and other writers in the *Westminster Review*.

Dodd, Charles, the assumed name of Hugh Tootel, an English Roman Catholic historian, who was born near Preston, 1672, studied at Douay and at St Gregory's, Paris, entered the priesthood, and settled (1697) as a preacher in Lancashire. He wrote a *Church History of England from* 1500 *to* 1688, which contains much curious and valuable information drawn from original papers, letters, &c. This work was published in Brussels in 3 vols. folio (1737–39–42), and a new and corrected edition was begun by the late M. A. Tierney, but only five vols. appeared (1839–43). D. wrote many other works. He died February 27, 1742–43.

Dodd, William, LL.D., a popular divine, was born at Bourne, in Lincolnshire, June 1729, graduated as B.A. at Clare Hall, Cambridge, and then went to London, where he soon gained a wide reputation for effective preaching. After holding a prebend in the collegiate church of Brecknock, he was, through the influence of his former pupil, Lord Chesterfield, made a chaplain to the King, but lost the office for trying to acquire the living of St George's, Hanover Square, by bribery. In return for the many favours he had received from his generous pupil and patron, he forged a bond for £2000 in the name of that nobleman, for which act he was condemned at the Old Bailey, 24th February 1777, and executed on the 27th June following. D. was meanly ambitious, and nourished habits of luxurious wastefulness. Of his many works, the chief are a *Commentary on the Bible*, *The Beauties of Shakespeare*, *Reflections on Death*, and *Sermons on the Miracles and Parables*. See D.'s *Memoirs*, prefixed to his *Thoughts in Prison*.

Dodd'ed Cat'tle are animals without horns. The name is also given to cattle which, naturally having horns, have had them cut off to prevent them goring their neighbours in the field or fold.

Dodd'er, a genus of annual leafless plants, of the natural order *Cuscutaceæ* (q. v.), which originally take root in the ground, but afterwards become parasitic, and sever their connection with the soil. There are two British species, *C. Europæa*, which chiefly attaches itself to thistles, oats, &c., and *C. Epithymum*, a smaller plant, which grows on thyme, &c. In addition, there are now naturalised in the English flora two other species or varieties, probably originally introduced with foreign seed, viz., *C. Epilinum*, the flax D., and *C. Trifolii*, the clover D. They are all very troublesome to cultivated crops, and the only remedy is to sift out the seed of the D. which has got mixed with that of the cultivated crop.

Dodd'ridge, Philip, a Nonconformist preacher and theologian, born at London, June 26, 1702. He was educated at Knibworth, Leicestershire, of which place he became a minister in 1722, and whence in 1725 he removed to Market Harborough, where he opened a school. About 1730 he settled as a dissenting minister in Northampton. Bad health induced him to visit Lisbon, where he died, October 26, 1751. His chief prose works are *Four Sermons on the Education of Children* (1732); *The Absurdity and Iniquity of Persecution for Conscience Sake* (1736); *The Family Expositor* (1738); *Rise and Progress of Religion in the Soul* (1744); *Course of Lectures* (1763). D. is, however, best known by his hymns, which glow with impassioned devotion, and justly rank among the finest products of the evangelical muse.

Dodec'agon (from Gr. *dōdeka*, 'twelve'), an equilateral and equiangular plane figure of twelve sides. If a be the length of the side, the area is approximately $11{\cdot}196\,a^2$.

Dodecahed'ron (from Gr. *dōdeka*, 'twelve,' and *hedra*, a 'seat' or 'basis'), one of the five regular solids, being bounded by twelve equal pentagons and thirty equal edges, and having twenty equal solid angles. If a be the length of each edge, the superficial area is approximately $20{\cdot}6457\,a^2$, and the solid contents $7{\cdot}66312\,a^3$.

Död'erlein, Ludwig, an eminent German philologist, was born at Jena, 19th December 1791, studied at Munich under Thiersch, at Heidelberg under Creuzer and Voss, and at Berlin, where he graduated, under Wolf, Böckh, and Buttmann. In 1815 he was appointed Professor of Philology at Berlin, removed to Erlangen in 1819, where in 1827 he became Director of the Philological Seminary. He died November 9, 1863. D. edited the works of Tacitus, the *Epistles* and *Satires* of Horace, and produced *Lat. Synonymen und Etymologien* (6 vols. Leips. 1838); *Handbuch der Lat. Etymologie* (Leips. 1841); *Homerisches Glossarium* (Leips. 1850–58).

Do'do, a singular wingless bird, which has become extinct, through human interference, within the last 300 years. It inhabited the island of Madagascar. Most naturalists relegate it to the Rasorial birds, as possessing its nearest living ally in the *Didunculus strigirostris*, or tooth-billed pigeon of the Navigator Islands. It was a clumsy bird, larger than a swan, and weighing about 40 or 50 lbs. The Dutch navigators named it *dod-aer*, of which word the English D. is a corruption. Various writers describe the D., but it appears certain that the bird, being unable to fly, offered an easy prey to the sailors who visited Mauritius. A specimen was deposited in the Ashmolean Museum at Oxford, but unfortunately was allowed to go to waste; the head and feet being alone preserved. A


Dodo.

good representation is contained in the British Museum. The legs were short and stout, the feet had each four toes; the tail was also short, and, like the rudimentary wings, carried a tuft of plumes. The bill was large, and prominently curved and hooked; the plumage a greyish brown, that of the females being paler. The D. was said to lay but one large egg. It is curious to note that the wingless Solitaire (q. v.) or Pezohaps disappeared, like the D., from the adjacent island of Rodriguez.

Dodo'na, a town in Epirus, was the seat of the oracle of Zeus, which was the most ancient in Greece. Homer attests its antiquity, and describes the Selli or Helli, who were the interpreters of Zeus. The god was believed to dwell in the stem of an oak, and the priests interpreted his will, as instructed by the branches of the tree. In later times, the oracles were interpreted by three old women. D. waned in influence with the growing importance of Delphi, and though it long continued to be consulted, and to enjoy wide celebrity, its advice was chiefly sought by the neighbouring tribes. In B.C. 219 the temple was destroyed by Dorimachus, general of the Ætolians. The site of D. has not yet been clearly established.

Dods'ley, Robert, an English author and publisher, was born at Mansfield, Nottingham, in 1703. The son of a poor schoolmaster, he was forced by bad health to serve as a footman, and in 1732 published *The Muse in Livery, or the Footman's Miscellany*, a volume of poems, which was followed by *Kitty, a Pastoral*, and *The Devil is a Dunce*. In 1775 his drama *The Toyshop* was, through Pope's influence, acted at Drury Lane, with such success that D. was enabled to open a bookseller's shop. He became a prosperous publisher, and wrote various plays, of which the most popular were *The King and the Miller of Mansfield* (1737), *Sir John Cockle at Court*, *The Blind Beggar of Bethnal Green*, and above all *Cleone*, which met with boundless applause. He published several of the works of Johnson and Pope, and started various periodicals, such as *The Public Register*, *The Museum*, *The Annual Register*. D. died at Durham, September 25, 1764. He is best known now for his *Select Collection of Old Plays* (12 vols. 1780).

Dog (*Canis*), a genus and the type of a family (*Canidæ*) of Carnivorous mammalia. The family includes not only the dogs, but their near allies the foxes, wolves, and jackals. As a family, these animals are distinguished by their pointed muzzles, smooth tongues, and by possessing claws incapable of being retracted as in the *Felidæ* or cats. The front feet each possess five toes, and the hinder feet four digits. They are Digitigrade (q. v.), in that they walk, like lions, &c., on the tips of their toes. The molar teeth in this family number either twelve in the upper jaw and fourteen in the lower jaw, or fourteen in either jaw. Two or three of the molars on each side are provided with tubercles or blunt processes. In the genus *Canis* itself—to which the wolf (*C. lupus*) and jackal (*C. aureus*) also belong—the incisor teeth number six, the canines two, the præmolars eight, and the molars four in each jaw. The pupil of the eye is round. The tail is of moderate size, and is covered with short hair. The subject of the relations of the various varieties or kinds of dogs assumes the same difficult aspect in treatment as that of determining the exact nature of the breeds of other animals, such as the ox and sheep, which have been extensively cultivated and reared by man; and the question becomes still more difficult when we attempt to determine the relationship of the so-called *wild* breeds of dogs to their more domesticated neighbours. Some naturalists incline to the belief that in the present day the D. is only known to us as a domesticated animal; and these authorities regard the wild races as having sprung from domesticated breeds. Others again maintain the distinct and primitive nature of certain wild dogs—such as the hunting D. or *Lycaon pictus* of S. Africa, and the Dhole or *Cuon Dukhuensis* of British India—and believe that these or similar forms may represent the progenitors of the many existing breeds of dogs. Mr Darwin inclines to the belief that the breeds of the domestic D. 'are descended from several wild species,' and he says, 'it cannot be doubted that there has been an immense amount of inherited variation; for who will believe,' he continues, 'that animals closely resembling the Italian greyhound, the bloodhound, the bulldog, pug-dog, or Blenheim spaniel, &c.—so unlike all wild *canidæ*—ever existed in a state of nature?' Another equally important subject is the question of the fertility or sterility of the progeny of the wolf and D. when interbred. We know with certainty that all our existing breeds of dogs can interbreed; and also that the D. will interbreed with the wolf and the jackal, although the exact extent of the fertility of the wolf and D. breed has not been determined. Probably the fertility is not affected by time, and in this view the common parentage or descent of the D., wolf, and jackal might be assumed by evolutionists. Le Roy instances a D. whose great-grandfather was a wolf, and which showed its wild origin particularly 'by not coming in a straight line to his master when called' (Darwin). The entire subject of the origin of the breeds or races of dogs becomes further complicated when we reflect that naturalists are by no means clear among themselves as to the characters which are to be deemed purely *specific* in their nature, and those which, on the contrary, are only of *varietal* value. Until, therefore, decisive information be obtained as to what characters constitute a true *species*, and what are those of a mere *variety*, the exact relationships of the dogs must remain a matter of conjecture and dispute.

The characters of dogs naturally vary with the particular breed or race to which they belong, and information on this head may be sought for in the separate articles devoted to the various kinds of dogs. The period of gestation in the D. is the same as that of the wolf—63 days—and this fact, together with the close similarity in the skeleton, has by some naturalists been cited as evidence in support of their similarity of origin and close relationship. An argument against this identity is derived from the observation that dogs when left to themselves, and when existing as nearly as possible in a state of natural freedom, do not tend to become savage or to exhibit wolfish characters. From the most ancient times the D. has been the companion, and, without exaggeration, one may say the 'friend,' of man. The ancient records, both sacred and secular, attest the close companionship of the human and canine races, and in ancient Egypt the D. assumed a high place in the phases of animal-worship. The average life of the D. varies according to its race, but in general is about twelve years. The intelligence of these animals also depends much upon the breed and training. The shepherd's D., Scotch terrier, and Newfoundland D., probably possess, of all the breeds, the greatest natural intelligence. See also SPECIES.

Laws Regarding Dogs.—To allow any *mischievous* dog to go loose or unmuzzled is an indictable offence; and if the dog injure any one, he will have ground for a claim of damage against the owner, but not unless the owner has had notice of the dog having bitten some one before. By 28 and 29 Vict. c. 60, the owner of a dog is liable in damage for any injury done by it to cattle or sheep; and in England it is not necessary for the party claiming damage to prove that the owner previously knew of the dog's mischievous propensity. In Scotland this knowledge must be proved, it having been so decided by the House of Lords, reversing the judgment of the Court of Session, in the case of Fleming *v.* Orr, April 3, 1853 (1 Macqueen). (See DAMAGES.) By 24 and 25 Vict. c. 96, any person convicted of stealing a dog before two or more justices may be imprisoned for six months, or forfeit £20 more than the value of the dog. A second offence is a misdemeanour, punishable by eighteen months' imprisonment, with or without hard labour. To receive money for restoring a stolen dog, or corruptly under the pretence of restoring one, is punishable with eighteen months' imprisonment. The duty on a dog is 5s. and shepherds' dogs are not exempt.

Dog'bane (*Apocynum*), a genus of plants belonging to the natural order *Apocynaceæ* (q. v.). The fly-trap (*A. androsæmifolium*) of N. America is cultivated in this country. 'The five scales in the throat of the corolla of this plant secrete a sweet liquid, which attracts flies and other insects to settle on them; the scales are endowed with a peculiar irritability, the cause of which has not been accurately determined, but which causes them to bend inwards towards the centre of the flower when touched, and to retain the unlucky flies as prisoners. Numbers of dead flies may be seen in the several flowers of this plant. The movement of the scales probably serves to scatter the pollen on the stigma' (Masters). The bark of the root is emetic, diaphoretic, and tonic, but in large doses more or less poisonous and acrid. From the fibrous bark of the Canadian or Indian hemp (*A. cannabinum*) and *A. hypericifolium* the Indians prepare the twine of their fishing-nets, linen, &c. Its roots have the same medicinal properties as the preceding species. The

milky juice of all the genus when dry exhibits the properties of India-rubber.

Dog'days. See CANICULAR DAYS.

Doge (Lat. *dux*, Eng. *duke*), the title of the principal executive magistrate in the Venetian and Genoese republics. The Venetian dogate goes back to 697, when Anafesto Paoluccio was elected. At that period the doges were actual sovereigns, but their supremacy soon began to arouse popular jealousy. The D. Orso was killed in 737, and for some years an annual magistracy ruled the republic. But the life-dogate recommenced in 742, and from that year till 1172, forty doges held the power, upon which limitations were imposed in 1032. Of these, only half were allowed to die a natural death. In 1172 the constitution underwent a change. The Great Council of 480 obtained the right to choose the D. Sebastiano Ziani was the first ruler under the new order, and in his dogate began the ceremony of the wedding of the Adriatic. (See BUCENTAUR.) Six members of the Great Council were delegated to advise the D., and the sixty *Pregadi*, or Venetian senate, performed a similar function. Thus the power of the D. was greatly circumscribed, but he still remained Captain-General of the Forces. After 1310 the appointment of the Council of Ten reduced the D. to a political nonentity, his office to a mere state show, with a few unimportant privileges, and several heavy drawbacks. The last D. of Venice, Lodovico Manin, was elected in 1788, the dogate lapsing with the fall of the republic in 1797. See VENICE.

The republic of Genoa was also governed by doges, of whom the first was Simon Boccanegra, elected in 1339. The Genoese dogate was held at first for life, like the Venetian, but under the new constitution of 1528 (see DORIA) was restricted to two years. The power of the D. was solely executive, legislative functions being discharged by councils. In 1804 the republic and the dogate both ceased to exist. See GENOA, and Hallam's *Middle Ages*, chap. iii.

Dog'fish, a name applied generally to certain genera of fishes, closely allied to the sharks, and included with the latter forms in the order *Elasmobranchii* (q v.). The D. belongs to the group *Plagiostomi* (q. v.), in which the mouth is transverse, and on the under surface of the head. The gills exist in the form of pouches or sacs, and open externally on the sides of the neck by distinct apertures. The pectoral fins exist on the breast, the ventral fins being abdominal in position. The dogfishes constitute the family *Squalidæ*, which includes numerous genera. Thus the genus *Scyllium* embraces the little D. (*S. caniculum*), the rock D. (*S. catulus*), and other forms. The genus *Pristidurus* is exemplified by the black-mouthed D. (*P. melanostomus*). The tope or miller's-dog is the *Galeus canis* of the naturalist, the smooth hound or D. being the *Mustelus vulgaris*. Another common species is the picked D. (*Acanthias vulgaris*). These fishes are all common in British waters, and are bold and voracious in habits. See also articles on the separate species of Dogfishes.

Dog Fox, a term applied to the male fox, and also to certain genera of dog-like animals belonging to the family *Canidæ* (see DOG), and represented by the *Corsac* (q. v.) and other species included in the genus *Cynalopex*.

Dogg'er, a kind of sea-going fishing-boat used by the Dutch.

Dogger-Bank, a great sandbank in the N. Sea, extending from 36 miles E. of Flamborough Head to 60 miles off Jütland. In some places it is 60 miles broad, and 9 fathoms in the shallowest part near England. It has valuable cod-fisheries. The Dutch and English fleets fought a drawn battle here in 1781.

Dog-Grass. See COUCH-GRASS.

Dog'ma (Gr. 'a decree') means primarily a decree, edict, or statute, as in Luke ii. 1, Acts xvi. 4, &c. In theology it means properly a positive statement of doctrine derived from divine revelation and enunciated by the Church; or, in a looser sense, the peculiar doctrine of a particular section of the Church, in which sense it is synonymous with an article of a creed. In the early Church, D. was sometimes used in the sense of the Christian religion or the faith of Christ, as the expositors generally supposed St Paul used it in Eph. ii. 15; and it has a similar meaning yet; so that D. is Christian doctrine generally, as distinguished from *a* D. or doctrine.

The history of D., or of the gradual development of the doctrines of the Christian Church, formerly treated only in connection with ecclesiastical history or dogmatic theology, has, on account of its extent and importance, been recently advanced into a special part of Church history. In this position it forms the transition from Church history to dogmatic theology, its basis being biblical theology, while dogmatic theology continually supplies it with materials. Dogmatic theology proper is the rationale of the whole D. of the Catholic Church at a particular time, and the subject of the history of D. is the D. as it presents itself in the various stages of its development. (See DEVELOPMENT OF DOCTRINE.) Comparative dogmatic theology (Ger. *symbolik*) has for its object a survey of the distinguishing principles of the different sections of the Church as embodied in their confessions of faith; and stands in the same relation to the history of D. as the Church statistics of any particular period stand to ecclesiastical history. The first attempt at compiling a system of dogmatic theology was made by Origen (q. v.). Augustine also wrote a work on Christian doctrine. But the founder of systematic theology was John Damascenus (q. v.), and the structure was completed in the Scholastic period, from the 8th to the 16th c. Since the Reformation, the Roman Catholic Church, regarding Protestants in the same light as the early Church regarded heretics, has found it necessary to exhibit her doctrine definitely in new confessions of faith. Protestants have also set forth their distinguishing principles in confessions which had reference to the Church of Rome, to the controversies within the Protestant Church itself (*e.g.*, between Lutherans and Calvinists), and to the tenets of heterodox sects (*e.g.*, Baptists, &c.). See Hagenbach's *Lehrbuch der Dogmengeschichte* (2 vols. 1840–41, Eng. trans. 1846); and Neander's *Dogmengeschichte* (Halle, 1856, Eng. trans. Bohn, 2 vols. 1858).

Dogs, Isle of (*Poplar Marshes*), a projection or peninsula of the northern bank of the Thames, 3½ miles E.S.E. of St Paul's, is insulated by the West India Docks, which are cut across the isthmus of the peninsula from the E. bank of the river on the one side to the W. bank on the other. It has an area of about a mile square, and though in the midst of a district of great activity, its appearance is squalid and uninviting.

Dogshores, pieces of wood so placed as to prevent motion in a ship about to be launched when all other supports are taken away. See LAUNCHING.

Dogs'tail Grass (*Cynosurus*), a very numerous genus of grasses, natives of Europe and Asia. The crested D. G. (*C. cristatus*) is the only one of the two species found in Britain of any value as a pasture grass. From its shining yellow seeds it is sometimes known as the *goldseed*.

Dog'wood or **Dog'berry.** See CORNACEÆ.

Doi'ley, or **Doi'ly** (perhaps from Dutch *dwaal*, 'a towel'), a napkin or small towel, sometimes coloured and embroidered, on which glasses are laid when the table is being spread for dessert.

Doit (Dut. *duit, duyt;* Ger. *deut*, from Venet. *daoto*, a piece of eight soldi, *da oto soldi;* compare Fr. *d'huit, de huit*, of eight), an old Dutch copper coin, of which eight went to the *stiwer* or halfpenny. It was also a division of the English grain Troy. It is used by the old English writers to mean a coin of most trifling value, or a matter of no consideration. See Shakespeare's *Coriolanus*, act i. sc. 5.

Dokk'um, a town in the province of Friesland, Holland, on the Ee, 11½ miles N.E. of Leeuwarden, with a haven accessible to the largest sea-going ships. It has shipbuilding yards, breweries, distilleries, potteries, and wool-carding establishments, and a trade in wool, cattle, butter, and cheese. St Boniface (q. v.) was slain here in 755. Pop. (1864) 4535.

Dolab'ra, in Latin, a hatchet or splitter (from *dolare*, 'to split,' allied to the Old Eng. *daelan* and the Ger. *theilen*, 'to divide'). In Latin it means a military, an agricultural, and a butcher's implement. Specimens are represented on the columns of Trajan and Antoninus.

Dol'ce (Ital. from the Lat. *dulce*), sweet or sweetly, used as an expression mark in music.

Dol'ci, Carlo, or Carlino, a famous Florentine painter, was born in 1616. He came of a family of artists, his father, grandfather, and uncle being all painters of repute in Florence. His life was passed in the pursuit of his art, and he produced many fine works. He died at Florence, 17th January 1686. D.'s style is marked by extreme delicacy and purity of colouring, and by elaborate finish. His range of subject was limited to madonnas, saints, holy families, and kindred themes. The most noted are his 'St Cecilia,' 'St Anthony,' 'Conception of the Virgin,' and 'Christ Blessing the Bread and Wine.' See Baldinucci's *Life of C. D.*

Dole, in Scotch law, is defined as the evil intention essential to guilt. Gross carelessness, however, is in certain cases criminal, without evil intention. This the law construes into D. See CULPA.

Dôle, a town in the department of Jura, France, in the beautiful Val d'Amour, on the Doubs, and on the Rhone and Rhine Canal, 28 miles S.E. of Dijon by railway. It has a tribunal of the first instance, a Jesuits' college, a public library of 36,000 volumes and 617 MSS., an art gallery, a museum of antiquities, &c., and is the centre of large iron industries and of an active trade in corn, timber, and marble. Its chief buildings are the large cathedral of Notre Dame, dating from the 16th c., the Hôtel-Dieu, of the 17th c., the Palais de Justice, formerly a Franciscan convent, and the ruins of a Roman bridge. Near D. are a mineral spring and marble and millstone quarries. Pop. (1872) 11,679. The town existed before the invasion of the Romans, from whom it received the name *Dola Sequanorum.* It stood on the Roman road from the Rhine to Lyon, and has still many remains of this period, as the ruins of two aqueducts, an amphitheatre, and a temple. Later it became capital of Franche-Comté, the seat of the parliament, and of a university (1423–81), and was strongly fortified, but was taken by Charles of Amboise for Louis XI. in 1479. In 1636 it was attacked in vain by the Prince of Condé, and in 1668 eagerly espoused the cause of Louis XIV., who now made himself master of Franche-Comté, and who razed the fortifications of D. in 1674. The Austrians under Bubna here forced the passage of the Doubs, 6th January 1814. D. was the headquarters of Garibaldi during the war of 1870.

Dol'erite, a term given by geologists to a group of igneous rocks of a dark green or grey colour, and composed of felspar (triclinic) with magnetic iron and olivine. The typical D. is a 'crystalline-granular mixture of labradorite and augite with magnetic iron.' It often contains small quantities of the carbonates of iron and lime.

Doles, at funerals (from *to deal,* 'giving money or bread in charity;' hence *to dole,* 'giving grudgingly'). This is a custom of the early and middle ages, probably founded upon the Catholic doctrine of prayers for the dead. D. were given to procure rest for the departed spirit; and the usage at one time prevailed throughout Great Britain of giving something to all classes of the community at a funeral. A slight resemblance to this Christian custom may be traced in the recent funeral of the Turkish Sultan, when a crowd of the poor followed to gather the small coins thrown to them on that occasion.

Dolgell'y ('dale of hazels'), the county town of Merioneth, N. Wales, on the Wnion, 3 miles above its estuary, and 46 W. of Shrewsbury. It is prettily situated near the base of Cader Idris, and its industries are chiefly woollen (Welsh tweed) and flannel weaving, tanning, bleaching, &c. The Wnion is here crossed by a stone bridge of seven arches. Pop. (1871) 2217, a number greatly increased in summer by visitors. In 1404 Owen Glendwr held a parliament at C., and there allied himself with Charles VI. of France.

Dolichoceph'alic, a term first introduced by Retzius to denote human skulls which are much elongated from before backwards, as distinguished from those termed *brachycephalic,* which have nearly as great breadth as they have length. See SKULL.

Dol'ichos, a genus of Leguminous plants, including several shrubby annual and perennial herbaceous species cultivated for their flowers, seeds, or young pods, which are boiled for the table. About sixty or seventy rather dubious 'species' have been described, from the tropical and temperate regions of Asia, Africa, and America. Among the best-known species is *D. sesquipedalis,* of the W. Indies and tropical S. America. In France it is much cultivated for the succulent young green pods, which are boiled for table. The tuberous root as well as the pulse of *D. tuberosus* of Martinique are eaten. The horse-gram of the E. Indies is *D. uniflorus.* The tubers of *Pachyrhizus,* an allied genus, are also used for food.

Dol'is, or Sa'ta, a town of Hungary, in the county of Komorn, about 40 miles W.N.W. of Pesth, consists of the Lake Town (Tóváros) on a small lake, and the Upper Town. The Esterhazy castle and gardens, and an old castle now in ruins, said to have been for some time a residence of Mathias Corvinus, are interesting. There are warm baths. Pop. 6100, engaged in the manufacture of woollen goods and Faïence marble.

Doll, a toy in imitation of the human figure, made of all varieties of material, from the article of shreds to the elaborately dressed miniature of French fashions, costing from 2000 to 3000 francs. In the neighbourhood of Sonneberg in Thuringia not less than 32,000 individuals find employment in the manufacture of toys, and of dolls alone there are exported from that locality annually 24,000,000. The materials used in D.-making are *papier-mâché,* vulcanised india-rubber, &c.

Doll'ar, a form of the Ger. *thaler* (Low Ger. *dahler;* Dutch, *daler*), from *thal,* 'a valley,' because first coined in Bohemia, about the close of the 15th c. From the German empire the coin passed into Spain and the Low Countries, and thence to the New World. The D. is now best known as the United States unit of money. The United States silver D., probably adopted from the Spanish, weighs 412½ grains of standard silver, one-tenth alloy. The cent, answering to the English halfpenny, is the hundredth part, the nominal value of the D. being 4s. 2d., but New York exchange on London is about $4·87 for £1. During the late war, paper money was made legal tender, and at present gold is worth 112⅝ in greenbacks.

Dollar (*dol* or *dal,* 'a vale,' and *ar, aird,* 'a height,' 'the vale among the hills'), a village in Clackmannanshire, on the right bank of the Devon, at the foot of the Ochils, 10 miles E.N.E. of Stirling, is chiefly noted for a flourishing academy, founded and endowed by Captain John M'Nab, a native of the parish, in 1818, at a cost of £80,000. Classics, modern languages, English, and the arts, are taught by a principal and nineteen teachers. The noble ruins of Castle Campbell, an ancient seat of the Argyle family, lie a mile N. of D. On the banks of the Devon there are numerous bleachworks. Pop. (1871) 2123.

Doll'art, The, a gulf of the N. Sea, at the mouth of the Ems, between the provinces of Groningen and E. Friesland, about 10 miles long by 7 broad. It was formed by irruptions of the sea in 1277 and 1530. Much of it has been reclaimed.

Döll'inger, John Joseph Ignatius, born at Bamberg, 28th February 1799, was at first a Catholic curate in Franconia, then Professor of Ecclesiastical History at Aschaffenberg (Church Training School), and latterly at the University of Munich, a chair which he subsequently resigned to Möhler, taking himself that of dogmatic theology. In 1826 his *Die Lehre von der Eucharistie in den drei ersten Jahrhunderten,* and in 1838 his *Lehrbuch der Kirchengeschichte* (which superseded a standard work by Hortig), gave promise of his later independence. As editor of the *Historisch-politische Blätter,* he wrote on semi-political subjects, as the mixed-marriage question, debated between the Archbishop of Cologne and the Prussian Government, Tractarianism, &c. In 1845 he entered the Bavarian Parliament as an Ultramontane, but lost his chair there and in the university through the influence of Lola Montez. In the National Parliament of Frankfurt he elaborated the definition of the relations of Church and State, which amounted almost to complete separation. In 1853 he protested against the proposed coronation of Napoleon III. by Pope Pius; and also produced his famous *Hippolytus und Kallistus,* a work on the Roman Church in the 3d c., written against the views of Baur, Bunsen, Lenormant, &c., in the controversy raised by Miller's *Philosophumena* (Eng. transl. 1877). In 1857 appeared his *Heidenthum und Judenthum* (translated into English by Darnell in 1862), an attempt to appreciate the social forces which favoured or retarded the spread of Christianity. His work *Kirche und Kirchen* (1861), in which he definitely argues against the temporal power of the Pope, has also been translated into English

by M'Cabe. In spite of his formal excommunication on 18th April 1871 for having resisted the doctrines of the Encyclical of 1864 and the Definition of 1870, D. has since received many honours, *e.g.*, in 1871, the degree of D.C.L. from Oxford, the rectorship of his own university, the Order of Merit from the Bavarian king, the Presidency (on Liebig's death) of the Royal Academy of Science at Munich, and in 1874 the Order of the Red Eagle from the Emperor of Germany. In September 1874 he presided at the Bonn Alt-Catholik Conference, where he declared that the Eucharist was not a perpetual renewal of the propitiation of Christ, and that he was not bound by the Tridentine Decrees. Among D.'s other works may be mentioned *Muhammed's Religion* (1838), and *Die Reformation, ihre innere Entwickelung und ihre Wirkungen* (1846-48), and a work on prophecy, translated into English by Plummer (1873). The bill for transferring ecclesiastical property to a committee of the ratepayers and communicants in each parish of the empire will greatly strengthen the Old Catholic party, of whom D. is the head, but he is now probably too old to undertake the task of reconciling the ideas of Catholic and Teutonic unity.

Doll'ond, John, F.R.S., was born in Spitalfields, London, June 10, 1706. He began business as a silk-weaver, occupying his leisure hours with the study of mathematics, anatomy, theology, and physical science, till 1752, when he set up with his son Peter as an optician. In 1753 he communicated to the Royal Society his improvement on the telescope, and soon after he entered into a controversy with Euler, who denied the conclusiveness of Newton's experiments on the possibility of obtaining refraction without colour. This led him to repeat Newton's experiments, and to solve the problem which Newton had deemed insoluble —viz., an *achromatic combination of lenses*. For this great discovery D. received the Copley medal from the Royal Society. He died November 30, 1761. See Kelly's *Life of D.*

Dol'men (Cym. 'stone table'), the name, chiefly used in France, of an interesting class of prehistoric monuments, similar to what are known as Cromlechs (q. v.) in this country. They are found in great numbers in Bretagne, but are also to be met with along the shores of the Baltic, in Friesland, the Netherlands, in the British Islands, in Spain and Portugal (where they are called *antas*), and even in Algeria and other parts of N. Africa. The principal dolmens in France are the famous Pierre Couverte near Saumur, the Table de César, not far from Lakmariaker, in Bretagne, the Pierre du Mesnik at Morvilliers, the Pierre de Gargantua in Eure-et-Loire, and the vast stone catacomb on the small island of Gavrinis, in Morbihan. The Pierre Couverte is a rude structure, covering an area of 65 feet by 17. Its walls consist of ten unhewn blocks, about six feet high, and it is roofed over with four immense slabs. The D. was long looked upon as a sort of altar, and identified with Druidical sacrifices, but antiquaries are now agreed in regarding it as a place of sepulture.

Dol'omite, or **Bitter Spar,** a mineral composed of the carbonates of lime and magnesia, and represented by large masses of magnesian or dolomitic limestones, which occur in the *Oolitic* formations. All dolomitic rocks contain a proportion of carbonate of iron, which sometimes exceeds that of the magnesian carbonate. In such cases they are named *Ankerite*. D. is usually brown or yellow, is very friable, and appears to result from the gradual metamorphosis of common limestone, the carbonate of magnesia taking the place of the original carbonate of lime. From its susceptibility to the action of the weather, it does not make a good building stone,—a fact well shown by the weathered and wasted appearance of the new Houses of Parliament.

Dol'phin (*Delphinus*), a genus of *Cetacean* mammalia, forming the type of the family *Delphinidæ*, which also includes the Narwhals (q. v.) and Porpoises (q. v.). The dolphins are distinguished from the whales by their smaller size of body, by possessing numerous teeth of conical shape in both jaws, and by the nostrils being united and placed far back on the upper aspect of the head. This single nostril, or *blowhole*, as it is termed, is crescentic in shape, and placed transversely. The head forms about one-seventh of the entire length of the body. The dolphins are recognised by the elongated snout, and by the head being separated from the snout by a depression. A somewhat hook-shaped dorsal fin exists in the centre of the back. The common D. (*Delphinus delphis*) possesses about 190 teeth. Its average length is about seven feet, but specimens measuring ten feet are not unknown. The back is black in colour, the sides greyish white, and the abdomen silvery. The eyes are small, and the aperture of the ears very minute. The female D. produces but one young at a birth. These animals tend their young with great care and fidelity. The D. is found in the European seas, and also in the Atlantic and Mediterranean. It is a lively, playful animal, often accompanying ships in shoals, and for long distances. The bottle-nosed D. (*D. tursio*) is a second species, which, however, possesses fewer teeth than its better-known neighbour. The French name the D. *Bec d'Oie* (goose-beak) and *Oie de Mer* (sea-goose), from its prominent beak.



Common Dolphin.

Dolphin, Black, a name given to the *Aphis fabæ*, a species of *Aphis* (q. v.) or plant-louse, found often in immense numbers on the bean. It derives its name from its black colour. These aphides cause great devastation in crops and gardens, and gardeners remove the top of the plants, for the reason that these pests first appear in that situation.

Dom-Boc, or **Doom-Book** ('book of dooms or sentences'), the code which Ælfred the Great compiled from the code of Ine of Wessex, the earliest extant collection of West Saxon law, and the code of Offa of Mercia. Ælfred was satisfied with expunging, modifying, and arranging preceding enactments, and added few original laws. Corporal punishment was assigned for many offences formerly punished by a fine or *blood-wite*, severe penalties were imposed on perjury and sacrilege, labour on Sundays and holy days was strictly forbidden, and the right of private revenge was restricted. Throughout there is visible a tendency to aggrandise the kingly power, alien to the early spirit of Teutonic government. The Ten Commandments and part of the Mosaic law were prefixed to Ælfred's code, of which Dr Pauli says, 'So strong an infusion of biblical principles is scarcely to be met with in any other collection of laws belonging to the middle ages. Nowhere do we find the idea of combining the old Teutonic with the Judaic Christian law into a uniform whole carried into such perfect practical application.' See Pauli's *Life of Alfred*, sect. v., and Thorpe's *Ancient Laws of England*, fol. i.

Dombrow'ski, Jan Henryk, a famous Polish general, born at Pierzowice, Cracow, August 29, 1755. He joined a regiment of Uhlans in 1770, became aide-de-camp in the Saxon service, and distinguished himself in the campaign of the Poles against the Russians in 1792. In the Polish struggle of 1794 he defeated the Prussians at Labiszyn and Bydgoszcz, and after Kosciusco's defeat at Maciejowice, nobly declined a high post in the Prussian army. In 1796 he was empowered by the French Directory to raise the *Polish Legion*—a body of Poles who fought under the French flag with the ultimate hope of freeing their country. These Poles signalised themselves at the battles of the Trebia, Novi, and others; but the Polish interests being ignored at the Peace of Luneville (1801) and of Amiens (1802), D. quitted the French service for that of the short-lived Italian Republic, and afterwards of the kingdom of Naples. When the French entered Poland in 1806 he rejoined Napoleon, and called on all Poles to win back their freedom. His countrymen responded eagerly, and until the Peace of Vienna (1809) were ably and bravely led by D., who also covered the French retreat at the Beresina in 1812, and, on Poniatowski's death, became commander-in-chief of the Poles. After 1815 he retired to his estate at Varsovice, which had been given him as a national reward. Here he busied himself with arranging his memoirs until his death on June 26, 1818. See Chodzko's *Histoire des Légions Polonaises en Italie* (Paris, 1829).

Dome (Lat. *domus*, Low Lat. *doma*, Ital. *duomo*, Fr. *dôme*, Span. *dombo*), in architecture, the spherical or concave ceiling of a building. Early in the middle ages D. was applied to a church ('God's house,' *Domus Dei*), and from such structures being often surmounted by a cupola, the word acquired its present meaning. Of modern domes, the most celebrated is probably

that of St Peter's in Rome. The external diameter is 195½ feet, being 2 feet more than that of the Pantheon; the diameter of the interior is 139 feet, being 3 feet less than that of the Pantheon. The traveller will hardly see any greater architectural wonder than St Peter's from the Campagna. The D. of the Pantheon (*La Rotonda*) is the most magnificent ancient D. in existence. It is supported by a rotunda 143 feet in diameter, exclusive of the walls, which are said to be 20 feet thick. Of St Paul's in London the D. is the most magnificent feature. While the general effect is powerful and grand, the outline is varied and graceful. Unquestionably an invention of the Romans, it was at Constantinople that the D. was first employed in ecclesiastical buildings.

Domenichi'no, properly **Domeni'co Zampie'ri,** one of the first painters of the Bolognese school, born in Bologna, 1581, studied first under Calvaert and afterwards entered the school of the Caracci. His first important work was the decoration of the Nolfi Chapel at Fano. After studying in Lombardy, he went in 1604 to Rome, where he painted, among other great works, a Madonna of marvellous beauty for Cardinal Aquechi. His magnificent 'Communion of St Jerome' (1614), now one of the chief treasures of the Vatican, his 'Martyrdom of St Agnes' in the Museum of Bologna, and 'Diana Hunting' (Borghese Gallery), are among the greatest of his pictures. He studied architecture, and on the accession of Gregory XV. (1621), was appointed architect of the Vatican. The Aldobrandini Palace at Frascati was built after his drawings. In design and in truth of expression, D. ranks the first of his school, while his colour is at once brilliant and delicate. He was persecuted by the jealousy of contemporaries, and his death, April 15, 1641, at Naples, is supposed to have been caused by poison.

Domes'day Book, the name of the great statistical survey of England drawn up by order of William the Conqueror during the years 1081–86. The name is the 12th c. form of the Old English *domesdaeg*, the 'day' on which a local court gave its 'dooms' or decisions; the D. B. thus meaning the book compiled from inquiries made on local court day, and perhaps, from the prevalent fears of the conquered English, had an additional reference to the 'day of judgment.' Its technical name was *Liber de Wintoniâ* as it was at one time preserved in the treasury at Winchester. Camden calls it the 'tax-book of kinge William.' The object of the survey was to know the king to whom and in what proportions the country was allotted, to guard small landholders against the encroachments of the great proprietors, and, in general, to facilitate administrative, legislative, and fiscal measures. 'Domesday,' says Mr Freeman, 'is the first known statistical document of modern Europe; it was the first survey of the kind which had been made since the days of the elder Roman Empire.' It was compiled by commissioners from information rendered on oath by the chief laymen and churchmen of each district. The survey gives the name of each estate, the name of its owner in the reign of Eadward and in the reign of William—for the reign of Harold is studiously ignored—its extent and the number and size of its woods, pastures, ponds, &c., the number of freemen and villeins upon it, its total value in William's and in Eadward's time, and the wealth of every freeman. It is of great historical value as a minute and thoroughly faithful picture of England before and immediately after the Norman conquest. It is not a mere colourless inventory, but is rich in details, which throw light on the manner of the confiscation of English estates, on the division of the country into shires, &c., on the different condition of various districts, and likewise on the character of William. It is marked by an air of consistent impartiality in its statements of the rival claims of Englishmen and Normans, King William himself being in one place included among those wrongfully holding the lands of others. The lawfulness of William's succession to Eadward, and of the transfer of lands from Englishmen to Normans, is throughout assumed, and the nature of the great confiscation is carefully veiled under legal euphemisms. 'Domesday teaches us better than any other witness of these times can teach us, that the England of the 11th c. and the England of the 19th are one and the same thing. Never was there a dry legal record so full of human interest of every kind as the great survey of England' (Freeman). The taxes were raised according to the divisions of the country given in the D. B. until 1552, when a new survey, called popularly the *New D. B.*, was made. See *General Introduction to D. B.*, by Sir Henry Ellis (new ed. 2 vols. 1833), Stubbs' *Select Charters*, and especially Freeman's *Norman Conquest* (vol. v. 1876).

Domes'tic An'imals are those which man, for various purposes, as for food or as beasts of burden, has trained and bred in near proximity to himself. This subject has already been partly noted under the head of Acclimatisation of Animals (q. v.). It will be found that, as civilisation advances, man's inroads upon both the animal and plant worlds grow more and more extensive; and his demands for articles of food, dress, and luxury, year by year open up new sources of supply, by the enlistment into his catalogue of resources of hitherto unknown kind; while he may also take advantage of natural qualities and phenomena, by interbreeding animals, and thus forming those combinations of their features which present the qualities or substances most in demand. (See BREED and SPECIES.) The circumstances that favour the domestication of animals are those that present to animals the qualities and conditions to which they have been accustomed in their natural state, although in many cases they may *adapt* themselves more or less completely to other environments and unwonted surroundings. We should perhaps distinguish between *acclimatisation* and *cultivation* of animals on the one hand, and their complete *domestication* on the other. The silk-moth, cochineal insect, ox, and horse, &c., may strictly speaking be described as 'cultivated' by man, whilst in the same sense we may talk of the dog and cat as 'domesticated.' But apart from strict etymological reasons, the term 'domesticated' is used to include all animals of use to man, to the breeding of which he gives his attention. It is not necessary to specify the various and diverse animals which are of use to man, or to indicate the many different sources which are being at the present time opened up for fresh experiments in the cultivation of commercial zoology. Pisciculture (q. v.), for example, is beginning to give important results even in its early stages of cultivation, and other departments of biology cannot fail in the future to afford as gratifying evidence of the rich stores that await our attention.

Domestic Ar'chitecture. The first consideration in building a house ought to be to make it healthful, the second should be to make it convenient, and the third to make it pleasing to the eye. These ends being in no way antagonistic, it ought to be possible to attain them all. Efficient drainage, with the means for efficient ventilation, are the chief requisites for a healthful house. Of course, the means existing, it must be seen that they are properly exercised. The inattention of the poorer classes to airing their little rooms, by opening their windows, is most blamable, and the evil effects of it ought to be pointed out forcibly, and due ventilation insisted on by those in a position to do so. Sleeping in kitchens, or in little rooms or alcoves off kitchens, should be avoided; hence in D. A., where means are sufficient, it should be made impossible to do so. In the houses of the middle and professional classes, servants' sleeping-rooms should be above-ground—at all events, quite apart from the kitchen. The arrangement of water-closets is a very important matter, which has so far not reached perfection. Every middle-class house ought to have three or four, with carefully-arranged communication with the house, but not in the heart of it. As regards convenience, arrangement of staircases, cupboards, closets, &c., the two latter are the important points. Scotch houses have generally more than English houses; but it is to be feared that this sometimes leads to the abuse of their being kept in dusty confusion. An airy, well-ventilated larder is a point of great consequence. It also should be well apart from the hot kitchen. In our country, to keep out the cold must of course always be a main object of D. A.; in Southern climes it is to keep out the heat. With us the problem of the day is from a minimum consumption of fuel to extract a maximum of heat.

Domestic Man'agement. A considerable and perhaps increasing number of people are forced to lament over the insoluble nature of the problem how to make one bank-note do the work of two. Seeing that this is impossible, the only plan, with a narrow income, to make 'ends meet,' is to lessen the work to be done by self-denial and thrift, and out of expenditure so regulated to extract as much rational pleasure as possible. To attain thrift, careful account-keeping is a necessity. With all housekeepers who do not attend to this it is a subject of constant wonder where money goes to. You have exceeded your

income one year; keeping careful accounts for the next will not bring back that which is gone, but by so doing you will discover where the leak is, or where the many leaks are. On one side enter all sums received; on the other side there should be various columns of £ *s. d.*, headed according to the various branches of your expenditure; thus, *rent and taxes, coal and gas, butcher, baker, education, furniture*, &c. Each item of expenditure should be entered under its appropriate head, and the book periodically balanced. If this system be carefully carried out, the mystery cannot fail to be solved. It will probably be found to consist largely in a wholly incredible consumption of various articles. In regulating expenditure the first consideration should be given to matters affecting health. When incomes allows, let every one have an airy, cleanly, and cheerful home. (See DOMESTIC ARCHITECTURE.) Let there be fitting decoration. In and about the cottages of the poorer classes there is no decoration so pretty as flowers, and they cost almost nothing. Perfect cleanliness, it is to be feared, requires a certain income; yet much may be done by means of two inexpensive articles—a tub and water.

The art of cookery should be carefully studied by all women of the lower and middle classes, and even by those of the higher. It would be well that they should acquire a certain amount of gastronomical acumen; because there is often a very unhappy discrepancy in this respect between a man and his wife. Women are often unable themselves to see the difference between a good article of food and a bad one, and they think their husbands unreasonable, who see a very great difference. Then by means of science a good dinner may be had for less cost than a bad one unscientifically prepared. Besides, good cookery is essential to health. So also, especially in our climate, a woman ought to have an economical and hygienic knowledge of clothing. Many young children die annually from being insufficiently clothed; purposely sometimes, under the mistaken notion of 'hardening' them. With regard to the furniture of a house—we speak here rather of the houses of the middle classes—harmony is especially to be studied. Showy articles should be avoided. In themselves they are probably not highly tasteful, and in combination with other articles, perhaps somewhat faded, the effect is unhappy. A drawing-room ought to *look* what it ought to *be*, a room for use and not for show. It ought not to look as if it was only used on special occasions. We should study to produce a tasteful, cheerful effect in selecting and arranging the furniture. Let signs of rational, pleasant occupation be habitually seen in it, books—books for reading, that is, not for show—music, and needlework of a rational kind.

With respect to the difficult question of *servants*, it would be well if women of the middle or even somewhat higher classes would learn to do much for themselves which, from false notions of dignity, they depend on servants doing. But as the relationship will probably always be necessary in some measure, the responsibility of improving the terms of it must obviously rest with the mistresses, for the plain reason that they have, as a rule, received a better education and culture.

Dom'icile is the place of residence of any one according to law. The D. of a minor is that of the father, unless the child be illegitimate, when, having no father in the eye of the law, the D. is that of the mother. A married women has the D. of her husband, which she retains on his death till she acquires another. The place where a man lives is presumed to be his D.; but the presumption may be overcome by proof of an intention of going back to a former residence. Mere temporary absence from home does not change D. But in many cases, after legal residence has been determined, there arise questions of the utmost nicety in the application of international law. For example, a Scotchman and a Scotchwoman had, in Scotland, an intimacy, from which issue was afterwards born in England, the father and mother having gone into England before any of the children were born, and continuing to reside there, where the father subsequently married the mother. According to Scotch law, an illegitimate child is made legitimate by the subsequent marriage of its parents. By English law it is not so. The question then was, were the children in question entitled as lawful issue to Scotch heritage? The Scotch court held that they were legitimate, and the House of Lords affirmed the decision.

The general rule of law is that personal property follows the person of the owner, and on his disease•must be distributed according to the law of the country of his D., though the mode in which the subjects vest in the successors is according to the *lex rei sitæ*. Real property descends according to the law of the land in which it is situated. A will is now valid in England, and always has been in Scotland, if executed according to the law of the country in which it is made. See FOREIGN LAW, APPLICATION OF.

Dom'inant, in music, the note a fifth above the key-tone. In connection with the chord of the D. and of the 'D. seventh,' see CADENCE and CHORD.

Dom'inant Ten'ement, in Scotch law, is the name of a tenement in favour of which a servitude exists. The tenement over which the servitude is, is called the *servient tenement*.

Domin'go, San, the capital of the Dominican Republic (q. v.), lies at the mouth of the Ozama, in a deep bay on the S. side of the island. It is quadrilateral in shape, and is surrounded by ramparts. Its principal buildings are a cathedral (1540), large barracks, an arsenal, a palace, and several convents and churches. Only small vessels can enter the harbour, and there is therefore but little trade. Pop. 15,000. D. was founded by Bartolommeo Columbus in 1494, and may be regarded as the first European settlement in the Western World. It was sacked by Francis Drake about 1586. The name of the city has superseded Hispaniola as applying to the whole island, which is also generally known as Hayti (q. v.), although including the Dominican Republic. D. is, besides, the name of several small rivers, settlements, and villages of S. America.

Dom'inic, De Guzman, St (in Span. **Domingo de Guzman**), was born in 1170 at Calarvegua, Old Castille. According to some, he belonged to the old family of Guzman, which had made alliances with royalty, but this statement is somewhat dubious. He was early distinguished as a learned theologian and a fervent missionary. After studying from his fourteenth to his twenty-third year at Valentia University, he became canon, and in 1198 archdeacon of Osma, in Castille. Being unsuccessful as a preacher in his efforts to convert the Albigenses, he gained permission from Innocent III. to call in military force against the heretics of Southern France, whom he persecuted with relentless fanaticism. (See ALBIGENSES.) His admirers, however, declare that he strove to mitigate the horrors of the war which he had mainly provoked. This crusade gave rise to the Inquisition (q. v.), of which D. is the reputed founder, but which in his time was not definitely organised. He established the order of the Dominicans (q. v.), and is said to have invented the rosary. D. died at Bologna in 1234, having won the title of 'burner and slayer of heretics.' Many grotesque miracles were ascribed to him, and he was said to have converted 100,000 souls. He was canonised in 1234. D. was a man of sincere but implacable and misapplied religious zeal, and though he seems to have been visited by occasional gleams of tenderness, his fiery, persistent intolerance stands in marked contrast to the angelic mildness of St Francis. He is mentioned in Dante's *Paradiso* (c. xii.) as a fellow-labourer with the Saviour. See Theodoric du Pay's *Vita S. Dominici*, Lacordaire's *Vie de Saint D.*, and Principal Tulloch's *St D. and St Francis*.

Domini'ca, or **Dominique**, the largest British island in the Lesser Antilles, W. Indies, lies between Guadeloupe and Martinique, and has an area of 291 sq. miles, and a pop. (1871) of 27,178. It is traversed by rugged mountains, of volcanic origin, which rise in one peak to a height of 5314 feet. There are many streams, and in various parts hot and sulphurous springs. The climate is moist and unhealthy, the soil singularly fertile. In the valleys, besides coffee, sugar, and cacao, are grown indigo, cotton, bananas, batates, and fruits. The hillsides are clad with forests of rosewood and other valuable timber. In 1870 the exports, chiefly rum, cacao, and sugar, amounted to £62,351; the imports to £60,277. The great majority of the inhabitants are liberated slaves; a number of the whites are descendants of the old Spanish settlers. Roseau or Charlotteville (pop. 6000), on the S. coast, is the capital; and the only other considerable place is the haven of Portsmouth. D. was discovered by Columbus on the 3d November 1493 (a Sunday, hence its name, 'The Lord's Day') but remained unoccupied till 1759, when its possession was assumed by the English. It was captured by the French under Bouillé, 7th September 1778, but was restored to

England in 1783. In 1802 England surrendered it to France, eventually to receive it again on the peace of 1814. Between D. and the islet Les Saintes, Rodney gained his famous victory over the French fleet under Grasse, April 12, 1782.

Domin'ical Letter, or **Sunday Letter**, one of the seven letters A, B, C, D, E, F, G, used to mark the days of the year, A marking the 1st of January, B the 2d, and so on; A marking the 8th, 15th, 22d, &c., and all days which have the same letters falling on the same day of the week. Consequently all the Sundays of the year are marked by the same letter, which is hence called the D. L. (from *Dies Dominica*, 'the Lord's Day,' or Sunday). The 1st of January 1875 falling on Friday, Sunday is the 3d, and the D. L. for the year is C. Common years consisting of fifty-two weeks and one day, the D. L. for the next year is one earlier; but leap-years having two days more than fifty-two weeks, and the 29th of February having no letter attached to it, have necessarily two Dominical letters, the first for January and February, and the second, which is the letter immediately preceding, for the Sundays of the rest of the year.

Domin'ican Republic, The, forms the Spanish or eastern part of the island of Hayti (q. v.). It was early colonised by Spain; but in 1795 it became French, as the west part of the island had already been. In 1814 France relinquished its authority in favour of Spain. The colony threw off the yoke of Spain in 1822, and united with the negro republic of Western Hayti, but again asserted its independence in 1843. In 1861 it once more placed itself under the government of Spain. A revolt, however, broke out in 1863, and Spain finally relinquished its changeful child. The D. R. has an area of 20,596 sq. miles, and an estimated pop. (1875) of 136,500. Its chief productions are tobacco and sugar. The capital is San Domingo (q. v.).

Domin'icans, a religious order organised by St Dominic (q. v.), who established the order of Dominican nuns in 1206, and of Dominican monks at Toulouse in 1215, the last foundation being confirmed by Honorius III. in 1223. A third section, the military order of Christ, composed at first of nobles and knights, and intended to war against heretics, was known, after Dominic's death, as the Tertiarians, and included members of both sexes. The D. were also known as Predicants—Chaucer's 'frère prechours'—or preaching friars, in England as Black Friars, and in France as Jacobins, from their convent in the Rue St Jacques, Paris. They rapidly grew in power and numbers, and were distinguished by their bitter hatred of heretics. (See ALBIGENSES.) They preached in the streets, administering the communion from portable altars, and wandered as missionaries into Asia. The Popes, of whom they were staunch allies, granted them many privileges, freed them from episcopal authority, and in 1272 recognised them as a mendicant order. They received the entire control of the Inquisition in Spain, Portugal, and Italy; and ceasing to be mendicants in 1425, held wealthier benefices than any other order possessed. Along with their rivals the Franciscans, with whom they had fierce controversies (see SCHOOLMEN), they were all-powerful in the Church, and very influential in politics, until the rise of the Jesuits (q. v.). The D. were opposed at times by the regular clergy, and by the University of Paris. Guillaume St Amour, Doctor of the Sorbonne, wrote a treatise against them, which was answered by the great Dominican Thomas Aquinas (q. v.), and condemned by Pope Alexander IV. They devoted themselves to polemic theology and to foreign missionary work. To their order belonged Albertus Magnus (q. v.) and Las Casas (q. v.). They were at first governed by the rule of St Augustine, with some additional regulations, and wore a robe, a black cloak, and a black pointed cap. In the 18th c. the D. possessed 1000 monasteries.

Dom'inis, Marcus Antonius de, a theologian and mathematician, born in 1566, at Arba, an island on the coast of Dalmatia, educated by the Jesuits at Loretto, and afterwards taught philosophy and mathematics at Padua and other Italian towns. He was successively Bishop of Segni and Archbishop of Spalatro, but having offended the Inquisition by some writings tinctured with Protestantism, he passed over into England in 1616, where James I. appointed him Dean of Windsor. In 1617 he published the first volume of his *De Republicâ Ecclesiasticâ*, in which he disputed the supremacy of the Pope. He afterwards returned to the Church of Rome, but his orthodoxy was always suspected, and Urban VIII. imprisoned him in the Castle of St Angelo, where he died in September 1624. The Inquisition caused his body to be disinterred and burned with his writings. In his *De Radiis Visus et Lucis in Vitris Perspectivis et Iride* (Ven. 1611, 4to) he first satisfactorily explained the phenomenon of the rainbow. His other works, in Italian, were translated, some of them into French and some into Latin.

Domin'ium, a Roman law-term denoting ownership. *Dominium Directum* and *Dominium Utile*.—The former term in Scotch feudal law denotes the right vested in the Superior (q. v.) of a heritable (real) subject. The latter term denotes the right of use and profit vested in the vassal. See also SUPERIORITY, CONSOLIDATION.

Dom'ino (Lat. *dominus*, 'lord'), originally a hood worn by the canons of a cathedral, later came to mean a woman's mourning veil, and eventually a loose silk cloak with a hood, worn by persons of either sex at a Masquerade (q. v.).

Dom'inos, a game usually played with twenty-eight oblong pieces of ivory or bone, which, with the exception of the blanks, are marked with dots ranging in number up to double six. There are various forms of the game, which is one of some antiquity.

Dom'inus Li'tis, a term of Scotch law, denoting the person having the real interest in a lawsuit, though nominally neither pursuer nor defender.

Domitia'nus, T. Flavius, son of Vespasian, and younger brother of Titus, was born at Rome, A.D. 52. After his father had been established as emperor, D. took part in the administration of Italy, but his career was marred by gross licentiousness and savage cruelty. He was jealous of the fame both of his father and of his brother, and the early death of the latter has been attributed to him. D. succeeded Titus, A.D. 81, and in the opening years of his reign displayed much energy and liberality. The external affairs of Rome under D. were of little moment, being confined to an expedition against the Chatti, A.D. 84, in which D. was successful, and an attack on Decebalus, king of the Dacians, who defeated the Romans, A.D. 87. In A.D. 84, D. withdrew Agricola from his great career in Britain, and from mean jealousy condemned him to private life. During the latter part of his reign he gave free vent to his wild and cruel passions. He sought the favour of the soldiers by increased pay, and of the common people by lavish gifts and public shows; while he shed with appalling frequency and freedom the noblest blood of Rome, and obtained a fresh supply of treasure by confiscating the property of the wealthiest citizens. He was assassinated by conspirators belonging to his own household, and with the knowledge, if not indeed at the instigation, of his wife Domitia, A.D. 96.

Do'mo d'Oss'ola, a town in the province of Novaro, N. Italy, on the Tosa or Toccia, here crossed by a long bridge. It lies in the beautiful Val d'Oscella, at the S.E. base of the Simplon, and is the chief key to the South Alpine tours. The Simplon can be scaled hence in seven hours. Pop. 2587.

Don, an Italian and Spanish contraction of the Lat. *dominus*, 'lord' or 'master.' The Portuguese form is *dom*, the Old Eng. *dan* or *daun*. In Spain and Portugal the word is applied as a title to all persons of noble birth, including kings and princes, but it is also bestowed in courtesy on those who are not grandees. The Latin form was originally assumed by the popes, and descended from them to all ecclesiastics and scholars. Hence the 'dons' of English colleges, and the 'dans' of old English poetry —*Dan* Chaucer, *Dan* Lydgate, &c. Tennyson has restored the word to modern English in his *Dream of Fair Women*.

Don (anc. *Tanais*, connected with the Celtic *afon*, 'water' or 'river'), a river of Russia, issuing from Lake Ivan-Ozera, government of Tula, and after a S.E. and then a S.W. course, falling into the Sea of Azof by three mouths, its entire length being about 900 miles. The navigation, on account of the shallowness of the channel from sandbanks, is conducted principally by flat-bottomed boats. The traffic on the lower waters is important, owing to the fisheries of the D., and the conveyance of Siberian produce to the S.

Don, a river in Aberdeenshire, rising in an elevated marshy district between the counties of Aberdeen and Banff, and falling, after a course of 78 miles, into the sea a mile N.E. of Old Aber-

deen. Its principal tributary is the Ury, from the N.W. It has valuable salmon-fisheries. The 'Brig of Balgownie,' the youthful dread of Lord Byron, from an old prophecy which threatened its fall with a wife's one son, crosses the D. about a mile from the sea.

Don, or **Dun**, a river in the West Riding of Yorkshire, rises near the borders of Cheshire, and after a course of 55 miles falls into the Aire, which soon after joins the Ouse. By means of canals and cuttings it is navigable to Sheffield, a distance of about 40 miles.

Donaghadee', a seaport of Ireland, county Down, on the Irish Channel, opposite the Copeland Islands, and 18 miles E. of Belfast by railway. It has considerable flax-mills, some industry in embroidering muslin for the Glasgow market, and an export trade in cattle, grain, timber, and potatoes. The harbour is commodious, and there are productive line and trawling fisheries. A conical mound, 140 feet high, to the N. of the town, commands a splendid view of the Irish and Scottish coasts. D. is connected by submarine telegraph with Portpatrick, in Wigtonshire, Scotland, distant 22 miles. Pop. (1871) 2064.

Don'aldson, John William, a distinguished philologer, was born in London in 1811. He was educated at the University of London, and at Trinity College, Cambridge. His first work was *The Theatre of the Greeks*, which was followed (1839) by the *New Cratylus; or, Contributions towards a more Accurate Knowledge of the Greek Language*, an important work, which reached a fourth edition in 1868. His *Varronianus*, a critical and historical introduction to the ethnography of ancient Italy, and to the philological study of the Latin language, appeared in 1844, at which time he held the head-mastership of the grammar-school of Bury St Edmunds. He subsequently resigned this post, and returned to Cambridge, where he passed the remainder of his life in tuition. Among his other works may be mentioned *Jashar*, an endeavour to identify in the Pentateuch fragments of the lost Book of Jashar; a Greek and a Latin Grammar; and an essay on *Classical Scholarship*. In 1856 D. was appointed classical examiner in the University of London. He died 10th Feb. 1861.—**James D.**, a Scottish schoolmaster and scholar, was born in Aberdeen in 1831. He studied at the universities of Aberdeen and of Berlin. In 1856 he was appointed a classical master in the High School of Edinburgh, of which he became rector in 1866. D. has published several classical text-books, but is best known by his valuable *Critical History of Christian Literature and Doctrine, from the Death of the Apostles to the Nicene Council*, in three vols., the first of which has been reissued under the title of *The Apostolical Fathers*, and by his edition (in conjunction with Professor Roberts of St Andrews) of a translation of the entire *Ante-Nicene Fathers* (Clark, Edinb. 1866–72). D. took an active part in the agitation that preceded the passing of the Scotch Education Act (1872); and in 1874 published *Lectures on the History of Education in Prussia and England, and on Kindred Topics*.—**James D.**, an Edinburgh printer, bequeathed in 1830 £215,000 to build and endow an hospital for the maintenance and education of poor children. A magnificent building, in the Tudor style, was erected at the west end of Edinburgh, from a design by W. H. Playfair, and was opened in 1851. It accommodates about 300 children, who are clothed and kept, and who receive an education qualifying the boys for trade, and the girls for domestic service.

Donatell'o (properly **Donato di Betto Bardi**), one of the greatest of Italian sculptors, born at Florence, 1383, was taken early under the protection of a liberal Florentine named Martelli, and received lessons in sculpture from Lorenzo Bicci. His first work was an 'Annunciation,' still preserved at Florence, and of which the draperies in basso-relievo are treated in the spirit of the antique. This work won for the sculptor applause, commissions, and the friendship of Lorenzo and Cosmo di Medici, for whose family he afterwards executed a noble monument. A great work, nicknamed by the Florentines *Lo Zuccone* (the Baldhead), is the finest of his six statues decorating the exterior of the campanile of Florence Cathedral. His marble statue of St Mark (St Michael's Church, Florence) drew from Michael Angelo the exclamation, 'Why do you not speak to me?' and the great bronze group, 'Judith and Holofernes,' is pronounced by Vasari a work of 'great excellence and mastery.' D. died December 13, 1466.

Dona'tion. A D. in expectation of death, or *mortis causa*, implies the reversion of the property to the donor should he recover. To be a valid gift, in a question with an heir or executor, there must be *actual* delivery of the thing meant to be given. Accordingly, a receipt for stock will not give the stock, because stock does not pass by receipt, but by transfer. But right to a bank-note will pass by delivery of the note. A D. is often revocable, but no deed is presumed in law to be a D. if it admit of another construction, and when there is doubt, the law holds a transaction to have been for Consideration (q. v.). Donations between husband and wife are revocable; but if the donor die without revoking, his or her representative cannot revoke. A reasonable post-nuptial contract is not revocable.

Don'atists, a sect of the early Christian Church, founded by Donatus, who, being defeated in his candidature for the bishopric of Numidia in 311, and refusing to admit that the *traditors*, or such of the clergy as had yielded up the Scriptures to the magistrates during times of persecution, were eligible for ecclesiastical offices, withdrew with numerous followers from the Catholic community. The D. soon became powerful in Africa, and in 330 possessed 172 bishops. They asserted that the *traditors* had broken the line of apostolical succession, that the integrity of the Church depended not on the succession of bishops, but on the holiness of each of its members. They professed to hold a doctrine of perfect purity, and carefully re-baptized each convert they made from the Catholic Church. In 348, when efforts were made to suppress them, they ravaged N. Africa as bands of fanatical marauders, under the name *Circumcelliones*, and were frequently seized with a frenzied desire for martyrdom. The D. were extinguished when the Saracens invaded Africa. See Neander's *Dogmengeschichte* (Eng. trans, Bohn, vol. ii. p. 394), and *Optatus Milevitanus*, edited by M. Dupin (Paris, 1700).

Dona'tus, Ælius, a grammarian and rhetorician at Rome in the middle of the 4th c., and tutor of St Jerome. His treatises, embracing a pretty comprehensive system of Latin grammar, were for many centuries the standard work on the subject, and formed the basis of most of the elementary books of the kind. In such repute were they during the middle ages, that the word *Donat* or *Donet* came to signify lesson or rudimentary treatise. D. was also the author of an interesting and valuable commentary on five of Terence's plays. The work entitled *Scholia in Æneida*, which bears the name of D., is generally considered to be by *Tiberius Claudius D.*, a grammarian of later date and inferior calibre, who wrote a worthless and slipshod *Life of Virgil*.

Don'auwörth, a town of Bavaria, 25 miles N.N.W. of Augsburg, at the confluence of the Wernitz and Danube. Pop. 3000. It has manufactures of linen and leather, and a trade in cattle, flax, linen, and wool. D. is memorable as the place where the Protestant League originated in 1607, whose formation was the immediate cause of the Thirty Years' War.

Do'nax, a genus of mollusca belonging to the class *Lamellibranchiata*, and to the section *Siphonida* of that class. This genus belongs to the family *Tellinidæ*. The shell is wedge-shaped, with the point rounded. Fossil species of D. occur in the Eocene rocks.

Don Beni'to, a town in the province of Badajoz, Spain, lies on the left bank of the Guadiana, 60 miles W. of Badajoz by railway. It has some woollen manufactures, and an active river trade in oil and wine. Pop. 14,800.

Don'caster (Roman *Danum*, Old Eng. *Don Ceastre*), a market-town in the West Riding of Yorkshire, on the right bank of the Don, 37 miles S.W. of York, and 156 miles N.N.W. of London by rail. It has some manufactures of cotton and wool-spinning, glovemaking, and hosiery, besides manufactures of iron, brass, and agricultural machines. D. races are among the most famous in the kingdom. The St. Leger, run in September, brings out some of the finest horses in England. Pop. (1871) 18,768. In 1874–77 it obtained new waterworks at a cost of £42,538.

Don Coss'acks. See Cossacks.

Don'da-ndu'gu (Kisuaheli, from *donda*, 'ulcer,' and *nduga*, 'brother' = brother-ulcer), a peculiar form of ulceration, confined to the lower extremities, endemic in Zanzibar and Eastern

Africa. This formidable disease is common in inter-tropical Africa, more especially after the rainy seasons, and it probably depends on the development of larvæ from eggs deposited by some species of insect. The ulcer is always situated on those parts exposed while the natives are travelling, with bare feet and legs, through mud and water, and most generally on the shin-bones, the gastrocnemius muscle or its insertion, the instep, and the toes. On the first appearance of the disease there is not, generally, very severe pain; the skin is smooth and glazed, and the sub-lying tissues have a boggy feeling, and not fluctuating as in abscess; in the centre there is a small spot, like an abraded pimple, exuding a little serous matter. An incision made at this stage reveals an extensive, deep-seated slough; but if left to itself the glazed skin soon separates as a slough. In severe cases the sloughing proceeds with great rapidity; tendons are laid bare, and the bone is denuded of periosteum; joints are opened, and the toes or foot may be separated from the limb. The disease is of the most loathsome description, both in appearance and odour; it is very fatal, and those who recover are generally permanently lamed. Death results from purulent absorption, from extreme exhaustion, and occasionally from hæmorrhage. This disease seems to be allied to the ulcer Yemenensis, common in Arabia. The late Dr Livingstone was confined to his hut at Bambarré, in Central Africa, for eighty days with this disease. The antiseptic is the only mode of treatment of any avail. The disease was first described by Dr Christie (*Cholera Epidemics in E. Africa*, Macmillan, 1876).

Don'dra Head, the southern extremity of the island of Ceylon, and the site of the ancient Singhalese capital, of which many remains still exist. A village of the same name in the vicinity has a pop. of 900.

Don'egal (Celt. *Dun-na-n Gall*, 'the fortress of the foreigners,' *i.e.*, of the Danes), a market-town and seaport at the mouth of the Eske, D. Bay, D. county, 29 miles N.E. of Sligo. Near the town are the ruins of a castle once belonging to the Earls of Tyrconnel. D. exports grain and butter. Pop. (1871) 1502. The chronicle of the town is contained in the *Annals of the Four Masters*, written at D.

Donegal, a maritime county in the N.W. of Ireland, province of Ulster, 85 miles long, with an average breadth of 41 miles. It has an area of 1871 sq. miles, and a pop. (1871) of 218,334, being a decrease of 19,061 since the census of 1861. D. is the most mountainous county in Ireland. Errigal in the N.W. attains an elevation of 2462 feet. The coast-line of 395 miles is indented by various bays and loughs, of which Lough Swilly is 25 miles long. Many islands fringe the coast, of which the chief are the N. Arran Islands. The streams are numerous but small, the principal being the Foyle and the Swilly. Of the lakes, the most noteworthy is Lough Derg (q. v.). Granite, metamorphic rocks, graywacke, trap, and carboniferous limestone compose the subsoil. The climate is moist. Much of the soil is poor, but the S.E. is fertile. The principal crops are oats, potatoes, and flax; there are manufactures of linen and worsted stockings; and fisheries of herring, cod, sole, and mackerel. The trade of D. is principally carried on through Londonderry. Among the minerals are marble, lead and copper ores, manganese, and pipeclay. Lifford is the capital of the county. D. returns two members to Parliament.

Dongarpur', the capital of a native state of the same name, in Central India, 155 miles N.N.E. of Baroda. It is fortified, and has a pop. of some 6000. The Rajput state of D., which is an offshoot of that of Odeyur, has been long governed with tact and intelligence. It is in part a wild hill-country, inhabited by feudatory tribes. Area 1000 sq. miles. Its revenue amounts to £7500. The Maharawal received the right of adoption in 1862.

Don'gola (New), Marakah, Kase Dongola, or **El Ordeh**, the capital of a province of the same name, Nubia, on the left bank of the Nile. It is the seat of an Egyptian pasha, and a flourishing place of trade, with a fort, well-stocked bazaar, and a pop. of 6000. It was founded by the Mamlukes, on the loss of Old D., the ruins of which are still visible 75 miles S.S.E., on the opposite bank of the Nile. Near New D. is the charming islet of Argo, on which have been found many Egyptian and Nubian antiquities.

Do'nis, Statute de, is the statute of 13 Edward I. c. 1. It is sometimes called the statute of 'great men,' as chiefly concerning the upper class and their interests. It created the power of entailing, by enacting 'that the will of the giver, according to the form in the deed of gift manifestly expressed, shall be henceforth observed.' See ENTAIL.

Donizett'i Gaëtano, an Italian musician, born at Bergamo, in North Italy, 25th September 1798, studied at Bologna, and for some time served in the Austrian army. He devoted himself at first to church-music (for writing which he was singularly unfitted), but afterwards to the opera. His operas are over sixty in number, among the best-known being *L'Elisir d'Amore*, *La Fille du Regiment*, *Lucia di Lammermoor*, and *Lucrezia Borgia*. D.'s music is more trivial, and his talent less than that of Rossini, of whom in many respects he was a follower. The flowing melody of his music has caught the popular ear, but the greater portion of it hardly deserves serious attention. D. died at his birthplace, April 8, 1848.

Don'jon (from the Low Lat. *dominio*, 'a lordship,' contracted *domnio*, *domgio*, *dongeo*), or **Dun'geon**, originally the principal building of a district, or the strong tower of a fortress. The form *donjon* is now applied, in fortification, to a large tower or redoubt, to which a garrison may retreat in case of need; *dungeon*, to an underground prison, such as used to be a portion of the strong tower of a fortress.

Don Ju'an, an imaginary personage, whose story symbolises the same idea as the old German legend of the Tannhauser—the idea of a soul in which regard for the spiritual has been burned out by ungovernable lust. According to the popular version of the legend, D. J. is a young nobleman of Seville, whose rare intellect and courage enable him for a time to pursue with impunity a career of eclectic profligacy. Having slain the father of one of his victims, in impious bravado he challenges the Supreme Power to animate the murdered man's statue, which he mockingly invites to a feast. The statue arrives as he requested, and carries the blasphemous libertine down to hell. This legend has been frequently embodied in literature. It was acted, as a *spiritual* play entitled *Atheista Fulminato*, in the Spanish churches and monasteries, but was first cast into regular dramatic form in *El Burlador de Sevilla*, by Gabriel Tellez, an imitator and contemporary of Calderon. In this play D. J. appears as the sombre but impressive incarnation of godless, sensual sin. Translated into Italian by Cicognini, the drama passed from Italy to Paris, and gave rise to Molière's *Festin de Pierre*, where D. J. is represented as an unscrupulous, plausible scoffer and voluptuary, but fallen from the grandeur of the Spanish poet's creation. The legend has served also as a groundwork for Shadwell's *Libertine*, for Mérimée's *Les Âmes du Purgatoire*, and for the plot of Mozart's *Don Giovanni*. Byron's D. J. has only the name in common with the legendary character; he is merely a youth who, being detected in an intrigue, leaves Spain to pursue a course of adventures in Greece, Turkey, Russia, and England.

Donk'ey Engine, a small auxiliary engine used on board ship for filling up the boilers and doing other work when the main engines are not in motion.

Donn, Robert, or **Robert Mackay**, born in the county of Sutherland in 1714, died 1778, probably the only one of the Gaelic bards who has received more attention and praise than his productions deserve. His poems were published in 1829, with a highly laudatory preface, and his clansmen raised a monument to him with inscriptions in Latin, Greek, Gaelic, and English. He is frequently spoken of as a poet of the highest order; but in truth, while one or two of his songs possess considerable merit, the great majority are commonplace, often interlarded with English words, and frequently disfigured by such coarseness as ought to have prevented their having ever been published.

Donne, John, an English poet and divine, was born in 1573. He was educated at Oxford and Cambridge, and studied law at Lincoln's Inn. Becoming master at the death of his father, a London merchant, of property worth £3000, he went abroad, and accompanied the expeditions of Essex to Cadiz and the Azores in 1596-97. Returning to England, he became secretary to Lord Chancellor Ellesmere, whose niece he secretly married. For this he was imprisoned, and on being liberated had to recover his wife by a lawsuit. He remained a poor dependant

on his friends, until James VI., pleased with his book *The Pseudo-Martyr*, induced him to take orders, and made him his chaplain. He became famous as a preacher and a poet, was made Dean of St Paul's in 1623, and, after receiving further preferment, died March 31, 1631. His poems, consisting of elegies, satires, epistles, and erotics, display a strange union of pathos and affectation, delicacy and coarseness. They abound in fantastic and jarring conceits; their verse is often harsh, and their thought crude; but amid their tangled intricacies runs an undercurrent of melody, and verses of the purest poetry occur. His *Sermons* (1640) are full of deep thought and far-fetched illustrations. Ben Jonson called D. 'the first poet in the world in some things.' See Isaac Walton's *Life of Dr J. D.*, prefixed to the first edition of his *Sermons*.

Doo, George Thomas, an eminent engraver, born in Surrey, January 6, 1800, well known for his prints after leading English artists and the old masters, such as Wilkie's 'Knox Preaching before the Lords of the Covenant,' Etty's 'Combat,' Correggio's 'Ecce Homo,' and Raffaelle's 'Infant Christ.' D. was appointed Historical Engraver in Ordinary to the Queen in 1842, an R.A. in 1856, and was Chairman of the London International Exhibition of 1862. His engraving of Piombo's 'Raising of Lazarus,' finished in 1861, was the result of eight years' labour.

Doom or **Doum Palm** (*Hyphæne Thebaica*), a palm of Upper Egypt, Central Africa, Nubia, Abyssinia, and Arabia, remarkable for its repeated forkings in a dichotomous manner. It will grow in the sandiest soil, and in some of the most desert parts it is the prevailing or sole tree. The fruit tastes somewhat like gingerbread, hence it is sometimes called the *gingerbread tree*. From the fibres of its leaf-stalks ropes are made. An infusion of the fruit is gently aperient, and accounted salutary in fevers. The hard albumen of the seed is turned into beads and other little ornaments. The hard, tough wood is useful for making various domestic articles. There are a few other species of the genus, which extends as far S. as Natal.

Doom'ster. See Deemster.

Doon (Celt. 'the dark water'), rendered by the muse of Burns the most classic of Scottish streams, rises in Loch Enoch, in the S.E. of Ayrshire, and flows through Loch D. Emerging from the loch, it rushes through the magnificent wooded ravine of Glen Ness, and after a course of 30 miles, falls into Ayr Bay, about 2 miles S. of the town of Ayr. Not far from its mouth is the cottage in which the poet was born, the monument erected to his memory, Alloway Kirk, the Auld Brigg, and all the magic associations of 'Tam o' Shanter.'

Doorn'boom (Dutch, 'thorn-tree'), the name given by the Dutch Boers, and now generally adopted in S. Africa, for *Acacia horrida*, the most common tree in the wastes of the Cape of Good Hope, &c. Its hard, tough timber is used for house-carpentry. See Acacia.

Doors, Doorways, have in all civilised ages formed an important detail of architectural composition, and in the successive well-defined styles of the art, they are invariably designed in harmony with the features of the special style, and their form and decoration supply data for determining the order and character of the building of which they make part, and the period of its construction. In the ancient Egyptian tombs, and in all primitive stone structures, the character of the architecture has been borrowed from a wooden original, and the doorways, as might be expected, seem reproductions in stone of the entrances of wooden cabins. The lintels are generally rounded, and the walls are, *in idea*, mere square posts, grooved and jointed together. The famous 'Pelasgic' tomb at Mycenæ is of the shape of a regular equilateral pointed arch, a form which their mode of building—with horizontal layers of stone projecting the one above the other, and with one small stone covering the apex of the vault—naturally and necessarily suggested. Familiarised with the curved line of the pointed arch, they made use of it in their doorways, which were often curved pointed arches. In some, however, the sides of the triangular opening were straight for the whole height; but though this form of entrance was very stable, it must have been exceedingly difficult to fit with a door or to close by any known contrivance. The difficulty was obviated at a later period by inserting a lintel half way up the opening. Below this lintel the jambs were nearly perpendicular, while above it they sloped so as to form a pediment, which was sometimes filled with sculpture. In the architecture of the ancients the doorways were usually rectangular; though sometimes the jambs had a slight inward slope. In later Roman architecture they were sometimes arched; and when rectangular, an architrave or suit of mouldings ran round them, and around the top; these mouldings were often heavier and more numerous than round the sides, and were supported at each end by a truss or bracket. The doors of the ancients were made of wood, metal, and, rarely, of marble, and were swung upon pivots working in sockets. In the doorway of the Old English church of Monkwearmouth in Durham, the arch is round and rests upon pillars, 'evidently copied,' says Fergusson, 'from turned posts in wood.' The Norman doorways were heavily enriched with ornaments, and show surprising variety of design. The arch was commonly semicircular, but was also segmental or horseshoe in form. The mouldings round the arch were sometimes so numerous that their breadth nearly equalled that of the doorway itself. Shafts, sometimes circular, sometimes octagonal, and occasionally ornamented with zigzags or spiral mouldings, and with capitals enriched with figures and foliage, were used in the jambs. The original Norman doors present little ornamentation with the exception of the iron of the hinges, which often extended more than half across the door, in fanciful scroll-work. The west door of Lichfield (1275), in the Decorated Style (q. v.), is an example of the architecture of the period in its highest perfection. The chapter-house door at Rochester is excessively rich in ornament, and is satisfactory in design; but there is little free-hand carving in its decoration, the greater number of the forms being produced by instruments. In this great work the tendency towards the more mechanical arrangement of the Perpendicular Style (q. v.) is already observable. In the doorways of this style the outer mouldings over the arch were usually formed into a square—the spandrels being filled with tracery, foliage, or sculpture; and the doors were usually panelled, and enriched with tracery. Of modern ornamental buildings, the doors and doorways are most commonly designed in the Early English or Decorated spirit.

Doq'uet, or **Dock'et**, an old English word denoting a summary of a voluminous writing. Attestations or declarations annexed to written instruments are called doquets. The notarial D. is a curious example of ancient style.

Dor. See Dung-Beetle.

Do'ra d'Is'tria, the pseudonym of Helena Ghika, Princess Koltzoff-Massalsky, a Wallachian authoress, born of a noble family at Bucharest, January 22, 1829. Her early studies and travels made her an accomplished linguist, and at the age of fifteen she undertook to translate the *Iliad* into German. She composed several dramas when very young; became famous for her beauty and acquirements; and in 1849 married Prince Koltzoff-Massalsky, whom she accompanied to the Russian court. After further travels she published *La Vie Monastique dans l'Église Orientale* (Paris, 1855), under the pseudonym D. d'I., in allusion to the Ister or Danube. Among her other works are *La Suisse Allemande* (Geneva, 1856); *Gli Eroi della Rumenia* and *I Rumeni ed il Papato*, both in Italian; *Les Femmes en Orient* (Zurich, 1860); *Des Femmes par une Femme* (1864); *La Vénitienne* (1864); *Au Bord des Lacs Helvétiques* (1864), &c. Her works are pervaded by ardent love of freedom and Christianity. She has produced numerous articles in French, Italian, and German journals, has attempted painting with success, and been chosen a member of learned societies which had never before admitted a woman.

Dorak', a town of Persia, province of Khuzistan, on the left bank of the Jarahi, about 44 miles from the Persian Gulf. It stands in a marshy plain, its houses are mostly of reeds, and it is partly circled by a thick mud wall. It is the chief seat of the Châb Arabs. The climate is unhealthy, and fever is prevalent. D. has a trade in rice, wool, and Arab cloaks, for the manufacture of which it is famous. Pop. about 8000.

Dor'cas Soci'ety. Charitable societies of ladies are sometimes so called, from the verse Acts ix. 39—'And all the widows stood by him weeping, and showing the coats and garments which Dorcas made while she was with them.' The object of the D. S. is the clothing of the poor and the employment of poor needlewomen.

Dor'chester (Old Eng. *Dorce-ceaster*), the county-town of Dorsetshire, situated on the Frome, 140 miles S.W. of London by rail. D. is a pleasant town, consisting mainly of three streets, the chief buildings being the shire-hall, guild-hall, St Peter's Church, the town exchange, and the jail. Pop. 6915. D. has considerable trade in agricultural produce, and brewing is carried on, the ale of D. being famous. The town, which was nearly ruined by a fire in 1613, was the scene of several battles in the civil war. Near it are the remains of a Roman camp and amphitheatre. Roman urns, coins, &c., have been found in the neighbourhood.

Dordogne', a south-western department of France, formed out of the province of Périgord. Area, 3536 sq. miles. Pop. (1872) 480,141. The surface is hilly, with level uplands, narrow, fertile, well-watered valleys, and several moors and marshes. The N. is mostly woody or barren; the S. rich in corn and vines. D. is remarkable for its numerous streams and ponds. It is named from the river D., which rises in Mont Dor, and of which the chief tributaries are the Ceon, Isle, and Haute-Vezère. The climate is generally mild, though the winter in the uplands is severe. The chief products are vines, chestnuts, maize, rye, and buckwheat. There are mines of coal, iron, lead, copper, and quarries of granite and sandstone. The leading industries are mining and the manufacture of woollens, charcoal, paper, brandy, cutlery, &c., but there is also a large trade in iron, wine, leather, ham, and the truffles of Périgueux. D. is crossed by the Paris-Agen Railway, and by the *Canal-de-la-Cité* and *Canal-de-l'Isle*. The largest towns are Périgueux, the capital, Bergerac, Ribérac, and Sarlat.

Doré, Paul-Gustave, a French painter and designer of great fertility and fancy, was born at Strasbourg in January 1832, was taken to Paris in 1845, studied at the Lycée Charlemagne, and after 1848 was engaged, along with Bertall (q. v.), to contribute sketches to the *Journal pour Rire*. From this date sketches, cartoons, and pictures have come teeming from his hand in the most marvellous profusion. To attempt to enumerate more than his principal works would be undesirable. He first exhibited in the Salon in 1848, and his sketches of the Battle of Alma (1855) and Battle of Inkerman (1857) attracted considerable attention. In 1860, and subsequently, he exhibited a series of impressive cartoons illustrative of the *Divina Commedia*. Later he contributed a vast number of drawings to the *Journal pour Tous* and to many other periodicals, and also illustrated the works of Rabelais (1854); the *Wandering Jew* (1856); the *Contes Drôlatiques* of Balzac (1856); the *Contes de Perrault* (1861); Montaigne's *Essais* (1857); Taine's *Voyage aux Pyrénées* (1859), &c. The works, however, by which he has earned a European fame are illustrations of Dante's *Inferno* (1861); *Don Quixote* (2 vols. fol. 1863); the Bible (2 vols. 1865-66); Fontaine's *Fables* (1867); Dante's *Purgatorio* and *Paradiso* (1868); Tennyson's *Idylls* (1866-68); Milton's Works (1866); a collection of drawings entitled *London* (1870); and Coleridge's *Ancient Mariner* (1875). D. is specially happy in rendering weird, unearthly subjects, to the effect of which his gloomy *technique*, consisting of engraved white lines on a black ground, greatly contributes. His grim humour finds vent in occasionally grotesque exaggerations of life and nature. The main objection to his art, apart from the defects of execution, is general dulness of tone, and the consequent want of atmosphere, point, and brightness.

Do'ria (originally **D'Oria**, the children of Oria, wife of Arduin of Narbonne, in the first half of the 12th c.), the name of an ancient patrician family of Genoa, which has furnished a long succession of historic names.—**Antonio D.**, elected consul in 1154, greatly advanced the trade and commerce of his native city. In the struggle between the Guelfs and Ghibellines, the Dorias, with few exceptions, took the side of the latter, and were in consequence highly favoured by the Hohenstauffens. They were also conspicuous in the conflicts of the Genoese families for political supremacy, and succeeded in obtaining for a time almost unlimited power. Their rule was the golden time of Genoa. During the 14th, 15th, and 16th centuries, their renown as commanders of the Genoese fleet was sustained by a series of brilliant victories over the fleets of the Pisan and Venetian republics. The most notable member of the family was **Andrea D.**, born at Oneglia, 30th November 1468. He served in the papal guard, and under various Italian potentates; and, as captain-general of the Genoese galleys, warred on the Moorish pirates. D. sided with François I. against the Emperor Karl V., and commanded the French fleet with signal success. Finding, however, that his native city was oppressed, he went over to the Emperor, and in 1528 drove the French out of Genoa. Karl offered to make him sovereign, but he patriotically refused, and was called 'Father and liberator of his country.' He formed a government, with a council (*signoria*) and a doge, who held office for two years. In 1535 he aided in the taking of Tunis, and in 1541 commanded the naval force in the Emperor's unfortunate expedition to Africa. Fieschi's conspiracy troubled his closing years, but this he crushed, and lived in great state at Genoa till his death, November 25, 1560. See Lorenzo Capelloni's *Vita del Principe D.* (Venice, 1569); Carlo Sigonio's *De Vita et Gestis Andreæ Doriæ* (Geneva, 1586). The family still survives, and is represented by several branches; that of Andrea by the Prince Doria Pamfili in Rome, and the Prince of Melfi and Valmontone, who occupies the palace of his great ancestor in Genoa.

Do'rians, The inhabitants of Doris, a small mountainous district of Greece, lying between mounts Œta and Parnassus, and embracing the valley of the river Pindus. They are said to have derived their name from Dorus, the son of Hellen, and are variously represented as inhabiting Doris, Phthiotis, and the whole country N. of the Corinthian Gulf. The last account best agrees with the historical importance of the D., who formed one of the four chief peoples of ancient Greece, and conquered the greater part of the Peloponnesus—a feat which they accomplished under the leadership of the Heraclidæ. During the historical period a great part of the Peloponnesus was subject to them. They founded numerous colonies in Asia Minor, Sicily, Southern Italy, and the islands of the Ægean. The D. are mentioned only once in Homer (Od. xix. 177), and then as a Cretan tribe: their conquest of the Peloponnesus must therefore be placed after his time. Like most mountain races, they were a stern, unpolished, earnest people. Their character is written both in their language and architecture, and stands out in striking contrast to that of their more polished neighbours.

Dor'ic Order. See COLUMN.

Do'ris, a familiar genus of Gasteropodous molluscs, including those forms familiarly named 'sea-lemons.' These molluscs belong to the order *Opisthobranchiata* of their class, and possess no shells in their adult state, but have the gills present in the form of beautiful plumes, situated towards the hinder extremity of the body, and which can be retracted or expanded at will. The head is provided with tentacles, and eyes are placed behind the tentacles. These animals are sometimes named 'sea-slugs,' from the resemblance to the more familiar land Gasteropods of that name. The sexes are united in the same individual. *D. Johnstoni* is a familiar species among the British examples of this genus.

Dor'islaus, Isaac, a Dutchman who came to England in the early part of the 17th c., and was made lecturer on history in Cambridge University by Fulke Lord Brooke in the beginning of the reign of Charles I. He lost this post for his avowed republicanism, became judge-advocate in the royal army, embraced the cause of the Parliament, helped to draw up the accusation against the king, and was murdered by several exiled royalists, May 2, 1849, at the Hague, where he had been sent as ambassador.

Dor'king, a market-town in the heart of Surrey, on the Mole, 29 miles S.W. of London by the South-Eastern Railway. It is picturesquely situated, and is composed in great part of fashionable villas. There are several handsome churches, among them that of St Barnabas, with a spire 150 feet high, built by Sir G. Scott in 1859. D. has some trade in flour, chalk, and lime, and gives name to a certain breed of fowls. Pop. (1870) 5419. D. is on the Roman road between London and Chichester.

Dor'mant (Fr. *dormir*, 'to sleep'), in heraldry, describes an animal lying on the ground with its forepaws outstretched, and its head resting on them. *Couchant* describes it with the head erect.

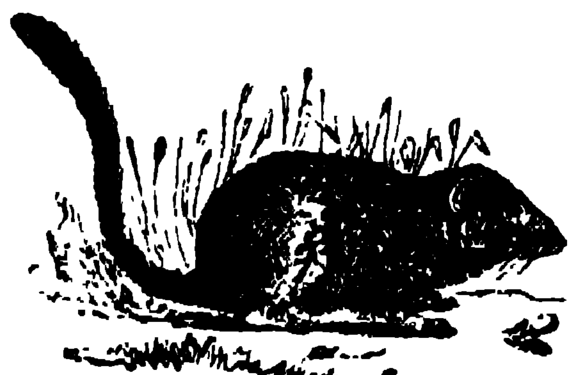
Dormant or **Poten'tial Vital'ity**, a term given to certain phenomena observed in some animals and plants, wherein the vitality of the organisms appears to exist in a state somewhat analogous to that we familiarly term *suspended animation* in man. Thus the seeds of plants may be kept in a dried parched

state for many years, and yet spring into healthy plants when placed in their natural conditions—namely, in moist earth. The familiar examples of wheat and peas found in ancient mummy cases illustrate the occurrence of P. or D. V. in plants. And a no less remarkable instance of D. V. is the case of certain seeds which had been covered over in Greece by the refuse of some mines not worked since the classic ages. These seeds, on being recently uncovered, sprang up into plants, and reintroduced into that neighbourhood plants which had been unknown since the times of the ancients. In animals an example of D. V. is seen in the case of the *Rotifera* (q. v.), or 'wheel animalcules,' highly-organised beings, of minute size, and common in all our fresh-water pools. These beings may be artificially desiccated, just as they are dried in nature by the summer sun, from the pools in which they live. They may be blown about as mere dust-specks by the wind, and may continue in this mummified state for months and years. Yet on the addition of a little moisture they at once resume all the functions of their lives with renewed vigour. Other animals (such as snails), and other animalcules (such as the Bell animalcules), &c., may similarly exhibit an apparent suspension for lengthened periods of all their vital functions. Instances which are sometimes given of insects, of fishes, and of other animals exhibiting this state of D. V. are not to be accounted true examples of these phenomena. The quiescent state of an insect undergoing its metamorphosis is not to be compared to the seemingly total suspension of all the functions of life, as seen in Rotifera; and such fishes as the Lepidosirens (q. v.) or mud-fishes (see also DIPNOI), when lying packed in their mud-nests, are not destitute of vitality any more than a hybernating bear or mouse can be said to be dormant. In the one case we have apparently complete cessation of all vitality, in the other the animals are simply in a state of torpidity, but breathe and exhibit other evidences of the presence of life. When we inquire as to the conditions which affect organisms so as to produce D. V., or those in virtue of which beings of high structure can apparently have their functions temporarily annihilated, we find that biology can say nothing definite in reply. To say that D. V. ensues as a result of the withdrawal of natural surroundings (as in the drying of the Rotifera), is simply a restatement of facts, and not an explanation of the *rationale* of the phenomena. We must, however, carefully distinguish between the use of the terms *revitalise* and *revive*. We can revive the being which exhibits D. V. or suspended animation by restoring it to its due surroundings, but we cannot revitalise a dead organism. Much confusion has arisen in discussing this subject from the indiscriminate use of these terms.

Dor'mer (Fr. *dormir*, Lat. *dormire*, 'to sleep') is an attic room formed by raising a gable resting on the rafters, and projecting vertically above the sloping roof of a house, and was so called because it was a contrivance resorted to for increasing the sleeping-accommodation of a house. D.-windows (Fr. *lucarnes*) have often been made an important detail in Gothic architecture, and the flamboyant *lucarnes*, constructed in France towards the end of the 15th and beginning of the 16th centuries, were especially elegant.

Dor'mitory (Lat. *dormitorium*, from *dormire*, 'to sleep'), the sleeping-hall of a religious house, boarding-school, hospital, &c., in which a number of beds for the inmates are ranged. The D. of the Abbey of Fontinelle (constructed in the 8th c.) was 208 feet long, 27 broad, and 64 high. In later times the D. of a monastery was often a series of cells, all opening upon a long gallery.

Dor'mouse (*Myoxus*), a genus of *Rodentia* (q. v.) belonging to the family *Myoxidæ*, which differs from the true mice, being more nearly allied to the Jerboas (q. v.), squirrels, &c. The family is known by the smoothness and compressed form of the incisor teeth, the molars numbering eight in each jaw, and having transverse markings on their crowns. The genus *Myoxus*, represented by the lerot or garden D. (*M. quercinus*), and by the common D. (*M.* or *Muscardinus avellanarius*), is known by its members possessing ears of moderate size, and long whiskers. The front feet have four toes and a rudimentary thumb, the hinder feet five toes. The tail is long and hairy. The members of this genus are confined to the Old World, and occur mostly in Europe. The common D. attains a length of five inches, is white-throated, of a light reddish-brown on the upper, and a lighter tint of the same colour on the under parts. It is nocturnal in habits, and its nest is built usually in some secure nook in a tree. The food consists of corn and nuts. The D. sleeps during winter; hence its name. The young number three or four at a birth. The lerot occurs in S. Europe, and attains a length of eight inches. Its colour is grey, tinted with red above and white below, and a patch of black below the eye. It commits much havoc in fruit-gardens. The fat D. or loire (*M. glis*), found also in S. Europe, was formerly eaten by the Romans, and was fattened in cages named *gliraria*.



Dormouse.

Dorn'birn, or **Torn'büren** ('thorn-dwelling'), an industrial town of Austria, in the crown-land of Tyrol and Vorarlberg, 8 miles S. of the Lake of Constance. It has manufactures of spinning, weaving, and embroidery. Pop. (1869) 8444.

Dor'noch (Gael. *Dor-n-ach*, 'the field between two waters'), the capital of Sutherlandshire, Scotland, and the only town in the county, is situated at the mouth of the D. Firth, 12½ miles E. from the Bonar Bridge station of the Highland and Sutherland Railway. It is a royal burgh (since 1628), was formerly the residence of the Bishops of Sutherland and Caithness, and has a cathedral said to date from the 11th c., which was destroyed by fire in 1570, and partially restored in 1837. It is now used as the parish church. D. attracts many summer visitors for bathing and golfing. Along with Wick, Cromarty, Dingwall, Kirkwall, and Tain, it returns one member to Parliament. Pop. (1870) 025.

Firth of D., a narrow sinuous arm of the North Sea, 20 miles long, receives the Shin, Oykel, Carron, and lesser streams.

Dorogobush', or **Dorogobouge**, a town in the government of Smolensk, Russia, on the Dnieper, 50 miles E.N.E. of Smolensk. It is well built, and has ten churches. It was partly burned by the French under Eugene, in their retreat from Moscow, 27th October 1812. Pop. (1869) 9099.

Dor'pat, or **Dörpt** (Rus. *Guriev*, Esth. *Tartolin*), a town on both sides of the Embach, government of Livonia, Russia, 150 miles N.E. of Riga. It is mostly built of brick or wood, and has a granite bridge across the Embach, which is frozen from the end of October to the middle of March. Its famous university, founded by Gustavus Adolphus in 1632, suppressed in 1710, and re-established by Alexander I. in 1802, is now attended by 650 students, and has a library of 80,000 volumes, botanical gardens, &c. The language of the people is Esthonian, but that of literature and of the learned is German. There is an active trade. Pop. (1867) 20,780, of whom many are Germans. D. was founded by the Russians in 1030, and was taken by the Teutonic Knights 1223, afterwards becoming an important member of the Hanse League. It has been the seat of a bishop since the 13th c., came into the possession of Poland in 1583, of Sweden in 1625, and was partly destroyed by Peter the Great in 1704.

Dorse (*Gadus*, or *Morhua callarias*), a species of *Gadidæ* or Cod—somewhat doubtfully regarded as a distinct species—found in the northern seas and in the Baltic. From its liability to variation in colour it has received the name of 'variable cod.' Its average length is two feet. It is hardly known in Britain.

Dor'set, House of, an old English family, settled in Sussex, which traces its origin from Hildebrand Sackville, one of the followers of William the Conqueror. The chief members of the family are the following:—**Thomas Sackville**, the first Earl of D. (See SACKVILLE.) **Edward Sackville**, grandson of the above, was born in 1590. James I. viewed him favourably, and put him at the head of the troops sent to aid the Elector-Palatine in the Thirty Years' War. In 1621 he was sent as ambassador to the French court, and in 1624 succeeded to the title Earl of D. Although Charles I. was very partial to him, D. often opposed the king's unconstitutional acts, and in 1640, when he was one of the regents appointed during the king's absence in Scotland, exposed and prevented the massacres arranged to take place in Ireland in October 1641. In 1641, as President of the Council, he strove to reconcile the king and Parliament, but

mediation proving useless he espoused the royal cause, and fought bravely at Edgehill. He died at Witham, July 17, 1652. Clarendon says he was distinguished for wit and learning. He left two sons, **Richard D.**, born in 1622, who was a member of the Long Parliament, imprisoned as an abettor of Strafford, became Lord-Lieutenant of Sussex, and died in 1677; and **Charles Sackville, Earl of D.**, who was born at Witham in 1637, went to sea under the Duke of York in 1665, and on the night before the sea-fight in which the Dutch Admiral Opdam's vessel was blown up composed his well-known ballad, *To all you Ladies now on Land.* He was a distinguished patron of literature, and the friend of Dryden, Waller, and Butler, whose *Hudibras* he introduced to the royal notice. He opposed James II.'s despotic measures, and was a favourite courtier of William III., whom he accompanied to Holland, and who made him Lord Chancellor. D. died at Bath, January 19, 1706. He was highly praised by Prior, and by Pope in his *Epitaph on D.* His writings consist of satires and songs, which, though trifling, are generally elegant and piquant. His son **Lionel** was made Duke of D. by George I. in 1720, and died in 1765. The title became extinct in 1843, on the death of **Charles Germain**, nephew and successor of that Duke of D. who was Byron's youthful friend.

Dorsetshire, a southern county of England, bounded S. by the English Channel, W. by Devon, E. by Hampshire, and N. by Somerset and Wilts. Area, 987·5 sq. miles; pop. (1871) 195,537. It is level in the N., but is traversed by chalk hills (Dorset Heights) in the centre. The coast-line, 75 miles long, is deeply indented on the E. by Poole Harbour, while in the W. it forms part of Lyme Bay. It is in places precipitous, occasionally standing out in bold headlands, as at Swanage, St Albans (934 feet high), and the Bill of Portland. The chief rivers of D. are the Stour, Trent, and Frome. In the W. the formation is oolitic, in the E. cretaceous. D. is an agricultural county, and the principal occupations are grazing and dairy and sheep farming. In 1875 there were 474,034 acres under cultivation—115,808 acres being in corn, and 62,870 in green crops, while 54,691 were under clover, sanfoin, and grasses in rotation, and 234,541 were, exclusive of heath and mountain-land, in permanent pasture. The number of cattle was 76,348, and of sheep, 518,316. There is a large export trade in dairy produce, and in Portland and Purbeck building-stone, coarse marble, and potter's clay. Dorchester is the capital, and the other notable towns are Poole, Bridport, Sherborne, Weymouth, and Melcombe-Regis. There is ample means of intercommunication by the London and South-Western and the Somerset and Dorset railways. The county returns three members to Parliament. D. has many interesting British and Roman remains, as barrows, stone-circles, camps, amphitheatres, &c. The ruins of Corfe (q. v.) Castle, a residence of the West-Saxon kings of England, are among the finest in the island.

The Dorset Sheep, in form of head and horns, resembles the blackfaced ewe sheep, but the whiteness of its face shows it to be less hardy. Dorset sheep are to be found in many parts of England, and also in Scotland. They are long in the leg, light in shoulder, and their average weight per quarter is from 20 to 25 lbs. The wool is of good quality, but the fleece is light, 4 to 5 lbs. being a good clip. Their chief merits are their excellence as nurses, and their great fecundity, twins with the ewes being a common circumstance. Their lambs are dropped in October or November.

Dort, or **Dor'trecht** (from Old Ger. *trift*, 'pasture' or 'meadow,' 'the pasture on the water'), an ancient town on an island on the Maas, province of S. Holland, Netherlands, 12 miles S.E. of Rotterdam, partly fortified on the land side. It is admirably situated for trade, having not only the Rhine and the Maas in its vicinity, but being furnished with numerous canals. Large rafts of wood from Switzerland and Upper Germany are floated down on the Rhine to D., which has numerous saw-mills, extensive shipbuilding yards, salt and sugar refineries, manufactures of tobacco, and a trade in seeds, grain, oil, and flax. Pop. (1874) 25,577. D. is famous in Church history for a great synod, held in 1618–19, which condemned the doctrines of Arminius (q. v.). The hall in which the divines met is now converted into a playhouse. It is perhaps still more memorable as the place where the United Provinces, after the expulsion of the Spaniards, held their first Assembly in 1572.

Dort'mund, a town in the province of Westphalia, Prussia, on the Cologne and Minden Railway, 47 miles N.N.E. of the former city. Its railway station is one of the largest on the Continent, with immense workshops for the manufacture of rolling stock. D. has also manufactures of woollen, linen, cotton, tobacco, and cutlery, breweries, and flour-mills, and is the centre of an important mining district. It is a very old town, and figures in the romantic and fabulous history of the dark ages. D. was already a town in the year 800, and was afterwards variously called, in mediæval Latin, *Throtmanni, Trutmanna, Trutmonia, Tremonia;* in German, *Trotmunde* and *Dortmunde.* It was a free imperial city and a member of the Hanseatic League, lost its prosperity during the Thirty Years' War, but has recovered it in recent times. Its old walls (12th c.), pierced by five gates, have been almost wholly removed. Pop. (1871) 44,420.

Do'ry, or **John Dory** (*Zeus faber*), a well-known species of Teleostean fishes, usually regarded as included in the *Scomberidæ* or Mackerel family, and distinguished, as a genus, by possessing a divided dorsal fin, the front or spinous part of which is less developed than the soft portion. The body is deep, and bony plates exist along the bases of both dorsal and anal fins. The name 'J. D.' is supposed to be a corruption of the French *jaune dorée*, a term given to this fish from the brilliant yellow colour of its body. The body is compressed, and the head curiously shaped, the mouth being very protrusible. Each ray of the first dorsal fin gives off long tendril-like processes. The colour exhibits a general yellowish hue, but the tints which pass over the body as the fish is dying are as varied as they are beautiful. The food of the D. consists chiefly of smaller fry and cuttlefishes. Its flesh is highly esteemed. It is also known by a peculiar black mark on each side, which superstition ascribes to the mark of the apostle Peter's finger and thumb, as he took this fish from the water to obtain the tribute-money. The average length is about sixteen inches. The D. occurs in most of the seas of Europe.

Dott'erel (*Charadrius Morniellus*) a species of *Charadriadæ* or Plovers, occurring in Britain, in N. Europe and N. Asia, but also migrating to the S. of Europe in autumn. The plumage is of a general brownish tint on the upper parts, the cheeks and throat being white, whilst the breast and under parts are white. The average length of this bird is 8 or 9 inches. It is captured for the London market in large quantities, and is in reality shy and wary, although usually reckoned a stupid animal.

Dou'ai, or **Douay**, an ancient town of France, department of Nord, on the Scarpe, 21 miles by railway S. of Lille, and about 70 miles S.E. of Calais. Of its once formidable fortifications there are some remains, and its notable buildings and institutions are the Church of Notre Dame (partly of the 12th c.); the artillery magazine and barracks; the imperial cannon-foundry; the Hôtel de Ville, a magnificent Gothic structure, with beautiful belfry; the library (40,000 vols.); the museum of natural history, antiquities, and art; a college for the education of English Roman Catholics, a university academy, and schools for law, physics, mechanics, chemistry, mathematics, gunnery, and for the training of male and female teachers. The industrial establishments comprise machine-shops, foundries, lace and thread factories, and chemical works. D. is connected by a number of canals and by the river Scheldt with the chief towns and departments of Belgium, and it is the centre of an active trade in oil, sugar, soap, brushes, linen goods, machines, and instruments, &c. Pop. (1872) 18,341.

Douai Bible. See BIBLE.

Doub'le Bass. See CONTRA-BASS.

Doub'le Con'sciousness is the name of a morbid mental condition, generally of periodic recurrence, which remains unconnected with the ordinary mental life of the patient, but the separate portions of which coalesce through memory and the ordinary laws of association, and thus form the material, if not the distinct conception, of a second personality. The stronger developments of this have occurred in the cases of hysterical and insane patients; but there is a milder form in which somnambulism, along with a consciousness of external impressions, alternates with healthy normal consciousness. The magnetic sleeper does not remember after waking what he has smelled,

tasted, heard, spoken, or done during the sleep; but when subjected to magnetism again, the memory of that and all previous magnetic sleeps revives. The sense of identity is often lost in the magnetic sleeper, although the sleeper may speak with accuracy of things known to him in his usual state. It is not known what causes the 'fault' in the mental connections. It has been hypothetically assigned to the independent action of the two hemispheres of the cerebrum (Holland, *On the Brain as a Double Organ*). It is not proved that the hemispheres do act in this manner; were that known, the problem would then be to connect this independent action with the morbid conditions of D. C., and to explain how the isolation is produced and terminated, and how the experience of the isolated hemisphere is prevented from afterwards coalescing with the healthy action of the whole brain. The idea of unconscious cerebration, or of mental life without consciousness, does not to any extent explain the phenomena of D. C., although it suggests how portions of experience lost to ordinary consciousness may be reached by a wave of nervous excitement.

Double Flat, in musical notation, a sign indicating that for the note to which it is prefixed a note two semitones lower is to be substituted. A **Double Sharp** indicates the similar substitution of a note two semitones *higher*.

Double-Shott'ing was the practice, in the naval tactics of an earlier day, of loading a gun with double the usual weight of shot for the purpose of increasing the destructive power. The design of modern cannon, and the perfect condition in which it is necessary to maintain them, render this practice impossible at the present day, while the rapidity gained by the adoption of the contrivance of breech-loading renders it unnecessary.

Doub'let (Fr. *doublet*, from *doublé*, 'doubled,' because lined), an article of apparel resembling a jacket, introduced into England from France about the middle of the 15th c., and worn by all classes for upwards of 200 years. Its use in England is marked by constant change of shape: the original garment was sleeveless, but sleeves were afterwards added; at one time it was tight-fitting, at another time loose; again 'pease-cod bellied,' then long waisted; till it finally, in the reign of Charles II., lost its individuality and was superseded by the waistcoat.

Doub'ling of the Cube. See DUPLICATION OF THE CUBE.

Doubloon' (Span. *dublon* and *doblon*, 'double'), the name of a gold piece of the value of two pistoles. During the 18th c. and subsequently, the value of the D. varied at different times. For some time previously to 1772 the value had been £3, 1s. 10d.; in that year the pieces were called in. They were subsequently reissued of the value of £3, 4s. 8d. The value of the *dublon de Isabella*, issued in 1848, is £1, 0s. 8d.

Doubs, a frontier department of France, bounded N. by Haute-Saône and Alsace, W. by Jura, E. by the Jura range, and narrowing in the S. almost to a point. Area, 2018 sq. miles; pop. (1872) 286,888. It is chiefly watered by the river from which it takes its name, and has the Oignon for its western boundary. The country is very mountainous, presenting three distinct zones in climate and productions—(1) The rich vine *Plaine* to the W., between the rivers D. and Oignon; (2) the *Moyenne-Montagne*, rising to a height of about 900 feet, and affording good pasture; and (3) the *Haute-Montagne*, running from N.E. to S.W. (from 2000 to 4000 feet high), partly covered with pine forests. Agriculture is gradually improving. D. is specially rich in minerals, including iron, coal, gypsum, and marble. It possesses many mines, six large furnaces, and seventy ironworks. In addition it has many active industries, and is traversed by the Rhône-au-Rhin Canal, and by the Dijon-à-Belfort Railway. Besançon is the capital, and the other important towns are Montbéliard, Pontarner, and Baume-les-Dames.—The *river D.* rises in the S.E. of the department, flows N.E. along the French frontier, forms a sharp loop within Swiss territory, and after several windings proceeds in a S.W. direction, eventually joining the Saône below Dôle, after a course of 115 miles.

Dough (Old Eng. *dah*, from *deawian*, 'to moisten'), the mixture of flour, yeast, salt, and water, prepared by bakers for putting into the oven to make bread.

Doug'las (Gael. *Dubhglaise*, 'black stream'), the chief town in the Isle of Man, lies on a fine bay, on the S.E. side of the island, at the mouth of a small river of the same name. From the beauty of the scenery, and the salubrity of the air, it is a favourite sea-bathing place. A deep-water landing pier has been recently erected. The older and lower part of the town is quaint and not uninteresting. Castle Mona, formerly a residence of the Duke of Athole, is now a hotel. D. has some linen, paper, and woollen manufactures. Pop. (1871) 13,972).—Another town of the same name in the county of Lanark, Scotland, has a pop. (1871) of 1371.

Douglas, the Family of. The origin of this famous Scottish family is unknown, but they were 'rooted in the country at the time when the Norman adventurers crowded in' (Burton). According to a legend, the name D. was derived from the exclamation of a Celtic chief, who, being sought by a Scottish king after a victory due to his prowess, cried '*Sholto Du-glas*' ('behold the dark-grey man'), and was rewarded with a valley in Clydesdale, which was henceforth known as the Valley of D., and whence his descendants took their name. The first of the house known in history is **William of D.**, a kinsman of the powerful house of Murray, who lived at the end of the 12th and beginning of the 13th centuries, and probably drew his title from his lands on the D. Water, in Lanarkshire. He was succeeded by his eldest son, **Archibald or Erkenblad of D.**, who was made a knight, and left two sons, William and Andrew. From Andrew descended the Douglases of Dalkeith and the Earls of Morton. The estates of D., now considerably enlarged, passed in succession to William and to his sons Hugh and William, surnamed the *Hardy*. This **Sir William of D.**, after various exploits in which he showed the reckless hardihood characteristic of the family, joined Wallace in 1297, yielded to Edward I., and died in prison, at York, about 1302. He held land on both sides of the Border and in various counties of Scotland. His son, **the Good Sir James of D.**, was the heroic and skilful associate of Bruce in the Scottish War of Independence. He was surnamed the 'Black D.' from his dark complexion. He was the *beau idéal* of knighthood, and was said to have fought in seventy battles and been victorious in fifty-seven. In compliance with Bruce's dying request (see BRUCE), Sir James sailed for the Holy Land, bearing the king's heart in a silver casket, and fell in a fight in Andalusia, in 1330, against the Moors of Granada. In memory of this expedition the Douglases bore a bloody heart and a crown upon their shields. The Good Sir James was succeeded by his brothers Hugh and Archibald. The latter married the daughter of John Comyn of Badenoch, and his son William became, in 1357, first Earl of D., and, through marriage, also Earl of Mar. His son James, second Earl of D., married Margaret, eldest daughter of King Robert II., and fell at Otterburn, in 1388. As he left no sons, his sister inherited the Earldom of Mar, while **Archibald D.**, surnamed **the Grim**, a natural son of the Good Sir James, succeeded to the Earldom of D. He added by marriage the barony of Bothwell to his estate, and married his eldest son and daughter to the eldest son and daughter of the king. He died in 1401. His son **Archibald** made an alliance with France, and in reward for his services in the French wars was made Count of Longueville and Duke of Touraine. He was slain at Verneuil in 1424. The fortunes of the House of D. culminated with his son **Archibald**, who also fought in the French cause. He died in 1439. At this time the Douglases held two-thirds of Scotland S. of Edinburgh, besides various estates in the N. The people viewed them as the champions of Scotland against England, especially after the victory of Otterburn, and since they had, single-handed, won back the Border-lands which Edward Baliol had ceded to Edward III. Moreover, through the marriage of the Good Sir James's brother with the sister of the Red Comyn and the niece of Baliol, the Douglases could found a most plausible claim to the Scottish throne, and but for Baliol's unpopularity they would have contested the accession of Robert II. Bitter rivalry arose between the Stuart kings and the Douglases. **William**, Archibald's successor, a youth of seventeen, was murdered along with his brother in Edinburgh Castle in 1440 by King James II., a crime popularly spoken of as the 'black dinnour of Earl D.' The Scottish Earldom of D. was held by the murdered stripling's indolent grand-uncle, **James the Gross**, until 1443, when William, son of James, inherited the D. domains both in France and Scotland. This **William** of D. was lieutenant-general to James II., united Galloway to

his possessions by marriage with his cousin, the Fair Maid of Galloway, and ruled almost as an independent sovereign until 1452, when James II. enticed him to Stirling Castle, under pretence of wishing a conference, and there stabbed him to death. His brother James declared war with the treacherous king, but shortly fled to England, leaving Archibald and Hugh D. to continue the struggle. They were beaten at Arkinholm in 1455 by George, fourth Earl of Angus, who belonged to a younger branch of the Douglases which was then at feud with the great house, but by which the fortunes of the family of D. were afterwards restored. James of D., who had fled to England, made a raid into Scotland with Albany in James III.'s reign, was captured, and spared on condition of entering Lindores Monastery. **House of Angus.**—This family sprang from a liaison between William, first Earl of D., and Margaret Stewart, Countess of Angus and Mar, whose descendants became Earls of Angus. After the victory at Arkinholm the fourth Earl of Angus was rewarded with the dominions of the beaten Douglases. Hence the popular remark that the 'Red D. had put down the Black,' Angus being of a florid complexion.—**George, Fourth Earl of Angus,** died in 1462, and was succeeded by **Archibald,** nicknamed 'Bell-the-Cat' (see JAMES III.), who was for some time Warden of the East Marches and Lord High Treasurer of Scotland. His eldest son fell at Flodden, his third son, Gawin D. (q. v.), entered the Church, and his son by a second marriage, Sir Archibald D. of Kilspindie, became Lord Treasurer of Scotland under James V. He was succeeded by **Archibald,** son of the George D. slain at Flodden. Archibald married Margaret, widow of James IV., and sister of Henry VIII. of England, by whom he had a daughter, afterwards mother of Henry Darnley (q. v.). During the minority of James V. Scotland was distracted by feuds between Angus and the Hamiltons. In the battle known as 'Clean the Causeway,' fought in the High Street, Edinburgh, the Hamiltons were, for a time, thoroughly beaten; and Angus, being made guardian of the young king in 1526, was practically sovereign till 1528, when James escaped from his custody. Thenceforth his power dwindled, and finally his estates were forfeited, and himself, after a stubborn resistance, was driven into England. On the death of James V. in 1542, Angus returned to Scotland, and was reinstated in his former possessions. He died in 1556. He was succeeded by his nephew, upon whose death the Earldom was held by **Archibald,** the 'Good Earl,' and from 1588 to 1591 by Sir William D. of Glenbervie, great-grandson of Archibald Bell-the-Cat. The old privileges of the D. family were restored to his son **William,** tenth Earl of Angus, who was appointed lieutenant-general of the kingdom, and privileged to lead the van in battle, carry the crown at a coronation, and give the first vote in Parliament. He became a Roman Catholic, and died at Paris in 1611. **William,** eleventh Earl of Angus, was in 1633 made Marquis of D. One of his sons was made Earl of Selkirk in 1646, another Earl of Forfar in 1666, and another Earl of Dumbarton in 1675. **Archibald,** the grandson of the first Marquis of D., was made Duke of D. in 1703, a title which expired with the decease of the first duke in 1761, when the Marquisate of D. descended to the seventh Duke of Hamilton, who belonged to a younger branch of the D. family. The D. estates, however, were in the great 'D. cause' transferred from the Duke of Hamilton to a son of Lady Jane D., sister of the first Duke of D. The new heir received the title Baron D. of D. Castle in 1790, a title which became extinct on the death of the fourth Lord D. in 1857. The D. estates then fell to the Countess of Home. **Earls of Morton.**—The Earls of Morton are lineal descendants of William of D., the first D. known to history. Sir William D. of Liddesdale, son of Sir Archibald of D., the successor to the first William of D., in 1320 obtained the lordship in Dalkeith which, along with other lands descended to his nephew, Sir James D. of Dalkeith, whose eldest son married a daughter of Robert III.; and their grandson was, in 1458, made first Earl of Morton. The present inheritor of the title is the direct descendant of William of D., the chief of the D. family in the 12th c. **House of March and Queensberry.**—The descendants of Sir William of D. of Drumlanrig, illegitimate son of the second Earl of D., became Counts of Drumlanrig in 1628, Marquises of Queensberry in 1633, Dukes of Queensberry in 1684, and Earls of March in 1697. In 1810, on the death of the fourth Duke of Queensberry, the title Duke of Queensberry and the lands of Drumlanrig devolved upon the Duke of Buccleuch, the title Earl of March upon the Earl of Wemyss, and the title Marquis of Queensberry to Sir Charles D. of Kelhead. See Douglas's *Peerage*, by Wood; Chalmer's *Caledonia* (Lond. 1807); Cosmo Innes's *Registrum Episcopatus Moraviensis* (Edinb. 1846); and *Registrum Honoris de Morton* (Edinb. 1853); Hume of Godscroft's *History of the Houses of D. and Angus* (Edinb. 1748); and Burton's *History of Scotland*, especially ch. xxviii.

Douglas, Gawin, a Scottish poet, born in 1474, was the third son of Archibald Earl of Angus, surnamed 'Bell-the-Cat.' He was educated at St Andrew's University, and entering the Church, became successively Rector of Hawick, Provost of St Giles at Edinburgh in 1501, and Bishop of Dunkeld in 1516. Party strifes finally lost him his see, and he had to take refuge at the court of Henry VIII. He is said to have received a pension from the king, and lived on terms of friendship with the foremost men in England, till his death of the plague in 1522. By his own wish, he was buried in the Hospital Church of the Savoy. D.'s first literary essay was a translation of Ovid's *De Remedio Amoris*, but this has been lost. In 1501 he wrote the *Palice of Honour*, dedicated to James IV. This is an allegorical poem, inculcating the principles of duty, its idea perhaps taken from Chaucer's *Temple of Fame*. That Bunyan borrowed from it, as has been supposed, is very unlikely. D.'s next poem was *King Hart*, an allegory of human life, in which the heart of man is represented under the type of a monarch. This work shows its author to have been acquainted with the *Piers Plowman* of Langland. A short poem in four stanzas by D., called *Conscience*, is also preserved. In 1512 he began his great work, the *Translation of the Æneid of Virgil*, which was completed just two months before Flodden. This was the first rendering of the *Æneid*, or indeed of any Latin classic, into English verse, and gives the twelve books with original prologues, characterised by a diffuse splendour of description. The work is marked both by strength and simplicity. D. is the first writer who applies the Celtic name 'Scotch' to the dialect of English used N. of the Tweed. His complete works have been elaborately edited by Mr Small (4 vols. Edinb. 1874). The first volume contains a careful and exhaustive life of the poet.

Douglas, General Sir Howard, Bart., G.C.B., son of Admiral Sir C. D., was born at Gosport in 1776, early entered the army, served in the Peninsular War in 1808-9, and was Governor of New Brunswick from 1823 to 1829. He successfully contested Liverpool in 1832 and 1835, was Lord High Commissioner of the Ionian Islands from 1835 to 1840, and M.P. for Liverpool from 1842 to 1847. He became a general in 1851, and died November 1861. He wrote treatises on *Naval Gunnery* and *Naval Evolutions*, *Considerations on the Value and Importance of the British and N. American Provinces*, and *An Essay on the Principles and Construction of Military Bridges*, &c.

Douglas, John, D.D., was born in 1721 at Pittenweem, Fifeshire, and after being educated at Oxford, entered the Church of England, and rapidly (1750) obtained preferment, being made in 1787 Bishop of Carlisle, and in 1792 Bishop of Salisbury. He died May 18, 1807. D. was not undistinguished in literature. He was intimate with Dr Johnson, and the most notable of his contemporaries. He is faintly remembered for his vindication of Milton against the forgeries of Lauder, and still more faintly for his answer to Hume in his *Criterion, or a Discourse on Miracles* (1754). D. also edited Cook's *Third Voyage*.

Douglas, Stephen Arnold, an American statesman, was born at Brandon, Vermont, April 23, 1813. He began life as a cabinetmaker, but afterwards studied law and settled in Jacksonville, Illinois, where he was known by the sobriquet of the 'Little Giant.' D. was chosen State Secretary in 1840, a judge in 1841, entered the House of Representatives in 1843 as a Democrat, and was a senator from 1847 to 1861. He advocated *Popular Sovereignty* in the Territories, and in 1854 his Kansas and Nebraska Bill, repealing the Missouri Compromise, let loose a torrent of political passion over the whole country. D. was the presidential candidate of the Northern Democrats in 1860, when Lincoln was elected. He died 3d June 1861. D. was idolised as a leader in the Western States. A splendid monument, costing $80,000, was erected to his memory at Chicago, on the banks of Lake Michigan.

Douglass, Frederick, an American orator, was born of a negro mother and white father at Tuckahoe, in Maryland, about 1817. He was a slave, first on a plantation and afterwards in Baltimore, but having taught himself to read and write, escaped from bondage at the age of twenty-one. For a time he worked on the wharfs of New Bedford, Mass., but soon attracting notice by his gifts, was employed as an agent of the Anti-Slavery Society. In 1845 he published his *Autobiography*, and soon after visited England, where the thrilling story of his life, and his manly oratory, excited much sympathy. For some years he was editor of a paper in Rochester, N.Y., and in 1855 wrote *My Bondage and Freedom*. In 1870 D. became an editor in Washington, and in 1872 was the first in the list of presidential electors chosen by the Republicans of New York state.

Doune (Gael. 'the hill'), a town in the parish of Kilmadock, Perthshire. It is famous for its fairs, the town standing at one of the entrances to the Highlands. *D. Castle* is a ruinous fort, with massive walls and towers, picturesquely crowning a steep green bank on the Teith. Pop. of parish (1871), 3170.

Dour, a town of Belgium, province Hainault, 9 miles S.W. by W. of Mons. In its neighbourhood are several iron and coal mines; weaving, bleaching, tanning, &c., are also carried on. Pop. (1873) 8501.

Dou'ro (Celt. 'the water'), or **Duero,** one of the largest rivers of the Spanish peninsula, rises in the N. of the province of Soria, flows first S.E. towards the town of Soria, then turns S., and finally W. towards and through Portugal, ultimately falling into the Atlantic at Oporto, after a course of 480 miles. For about 52 miles it forms the boundary between Portugal and Spain. It is generally rapid and unfit for extensive navigation, but traverses a naturally rich and picturesque country.

Dove, a general name given to all the members of the *Columbidæ* or Pigeon family, but used only in a popular and general sense, the term being without any specialised signification. The name is probably derived from the same root as the word 'dive.'

Dove, in Christian art, was regarded as symbolical of purity, and is for that reason carved upon the tombs of infants and young girls. It was the recognised type of the Holy Spirit from the circumstance that the Spirit descended upon the Saviour in the shape of a D. To signify that at baptism the infant is admitted into the Church, the D. is often carved on the covers of fonts in many English and foreign churches. Frequently a gold or silver D. was suspended from the vault of the ciborium in which the Holy Eucharist is preserved. In baptistries, also, a pigeon of gold was kept for the same purpose. In old pictures the D. frequently appears either as the symbol of purity, of the purified soul, or of the Holy Spirit. A simple gold nimbus, or one encircling a black cross, often surrounds its head, and seven rays proceeding from its head signify the seven gifts of the Holy Spirit. The figure of a D. with an olive branch is the emblem of peace, while one rising from the lips of dying saints is emblematical of the flight of the disembodied spirit. A D. with six wings, two attached to the head, two to the shoulders, and two to the feet, is a type of the Christian Church.

Do've, Heinrich Wilhelm, a German physicist and meteorologist, was born at Liegnitz, in Silesia, October 6, 1803, studied at Breslau and Berlin, became in 1829 Professor of Natural Philosophy at Berlin, and has since applied himself chiefly to the investigation of meteorological phenomena, as climate, winds, &c. The sciences of optics and electricity have also claimed a share of his attention, his most practical discovery being probably the application of the stereoscope to the detection of forged bank-notes. His principal works are *Ueber Mass und Messen* (1835), *Meteorolog. Untersuchungen* (1837), *Untersuchungen im Gebiet der Induktions-elektricität* (1843), *Temperaturtafeln* (1848), *Monatsisothermen* (1850), *Gesetz der Stürme* (1861), and *Die Witterungserscheinungen des nördl. Deutschlands* (1858-63, new ed. 1864). He is best known in England by his treatise on the *Distribution of Heat on the Surface of the Globe*, published by the British Association in 1853.

Dovecot. Pigeons are protected by the statute 2 Geo. III. c. 29. The Act does not extend to Scotland, but the breaking into a D. is under an old Scotch statute held to be theft, and severely punishable. See PIGEON.

Do'ver (probably Celt. *dfr* or *dwr*, 'water,' but possibly the Old Eng. *ofer*, 'the shore,' with a prefix), a municipal and parliamentary borough, seaport, and a great centre of international traffic, on the E. coast of Kent, at the entrance to a valley running along the N. slope of the N. Downs, 88 miles from London by the South-Eastern, and 77 by the London, Chatham, and Dover Railway. It is the chief of the Cinque Ports (q. v.), and the seat of their government. During recent years D. has considerably increased in population and in wealth; its older streets have been widened and improved, a number of its old and interesting buildings restored, large and elegant commercial and other establishments erected, and its suburbs much extended. The principal recent buildings are the hotels, the marine telegraph offices, and the lines of residences built along the Esplanade, Marine Parade, and East Cliff. St Mary's and St James's churches, in both of which structures Norman features are still traceable, have recently been restored, and the ancient Maison Dieu was restored (1861), and in part rebuilt, from designs by A. Poynter. On the S.E., on the cliffs, is D. Castle, a powerful but unfinished fortress, embracing with its old and new works an area of about 50 acres, and fortified by walls, ditches, bomb-proof magazine, batteries, &c. In the barracks there is accommodation for from 3000 to 4000 men. Other heights around the town are surmounted by barracks and fortifications. The commercial activity of D. arises chiefly from the circumstance that it is the great port of intercommunication between England and the Continent. In 1873, 2134 vessels of 335,150 tons entered and cleared the port. Extensive works have long been carried on at the port of D., with the view of making it a harbour of refuge. Of these, one of the most important was the Admiralty Pier, commenced in 1874, designed to enclose an area of 520 acres. A submarine cable was laid from D. to Calais in 1850. D. sends two members to Parliament. An important British stronghold prior to Cæsar's invasion, it was the *Dubris* of the Romans. Owing to its position on that part of the English coast nearest to France, it has frequently been the scene of important events during the history of the country. D. was the point at which Cæsar made his first attempt to land. It was created one of the Cinque ('five') Ports by Edward the Confessor. The town was restored and strengthened by William the Conqueror. It was attacked and plundered by a French fleet in 1295, and its castle has been frequently besieged. The defensive works were greatly strengthened in 1745, when a visit of the Pretender was expected, and again in 1804, when Napoleon threatened invasion.

Dover, the capital of Delaware, U.S., is situated on a rising ground, 5 miles W. of Delaware Bay, and 65 miles S.S.E. of Philadelphia by railway. It has a handsome state-house, a library of 30,000 volumes, and six churches, while the streets run at right angles, and are lit with gas. There are large steam flour and saw mills, and a trade chiefly with Philadelphia in flour and fruit. Pop. (1870) 1906.

Do'veron, or **Dev'eron,** a river of Scotland, rises on the slope of the Buck of the Cabrach (Cairngorm range), Aberdeenshire, flows N. in that county for about 7 miles, and then in a generally N.E. direction, partly in Aberdeenshire, partly in Banffshire, and partly between the two, till passing Banff, it enters the sea after a course of about 55 miles. D. and its affluent the Bogie are both good trout-streams.

Dover's Powder, consists of 1 part of ipecacuanha, 1 part of opium, and 8 parts of sulphate of potash. The dose is 10 to 12 grains. It is a powerful diaphoretic, producing copious perspiration, and is very beneficial at the onset of a cold. D. P. is often sold in shops under the name of *Sweating Powder*.

Dover Strait (Rom. *Fretum Gallicum*; Fr. *Pas de Calais*), the narrow seaway between Great Britain and the Continent, leading N. into the North Sea, and S. into the English Channel. It varies in width from about 20 to 25 miles, the distance from Dover to Cape Grisnez being 21 miles, and to Calais 25½ miles. It varies in depth from 2 to 30 fathoms, and recent surveys seem to prove that its bottom is formed of homogeneous beds of chalk, and that the project of boring a submarine tunnel through these

beds is practicable. This project is at present (1876) under consideration by the most eminent engineers of England and France. In July 1875 Captain H. Webb, late of the English mercantile marine, swam across the Strait in twenty-two hours.

Dov're Fjeld. See NORWAY and SWEDEN.

Dow, Dou, or **Douw, Gerard,** a Dutch painter, born at Leyden, 17th April 1613, entered at the age of fifteen into the studio of Rembrandt, and painted there for three years. The vigorous and original character of his genius is evinced by the fact that though during these three years he attained to much of Rembrandt's power of colour and of light and shade, he freed himself from the influence of the great master of chiaroscuro, and devoting himself exclusively to the study of nature, created a style which was as remarkable for its delicacy and perfection of finish as Rembrandt's was for breadth and unique effect. The threads of lace and texture of carpets are distinguishable in his smallest works, which, notwithstanding this devotion to detail, are powerful in effect and splendid in colour. His 'Dropsical Woman,' the most remarkable of his works for number of figures, correct and various expression, magical effect of light, and wonderfully minute and successful work, was bought by the King of Sardinia for 30,000 francs, and is now in the Louvre. Other works are the 'Mountebank,' 'Dentist,' 'Grocer,' 'Fiddler,' and the 'Interior of a Household,' in which the painter represents his mother reading the Bible to her aged husband. His portrait, painted by himself, was valued at Paris in 1837 at 10,700 francs. D. died at Leyden in February 1675.

Dow'ager (Fr. *douairière*, 'one dowered,' from the Lat. *dos*, 'a dowry' or 'marriage gift'), the distinctive name of a widow with a Jointure or Dower (q. v.). It is chiefly used in England as a title in high rank to distinguish a widow from the wife of her husband's heir bearing the same name. A 'queen-D.' is the widow of a king.

Dower (Fr. *douaire*, from Lat. *dotarium*, and that from *dos*), in English law, is that portion of property to which a wife is entitled on the death of her husband. D. is either by *common law* or *custom*. By the first, the widow is entitled to one-third of the estate during her life. The second varies with the custom of the place. By Gavel-kind (q. v.) it is one-half. By 3 and 4 Will. IV. c. 105, women married after 1st January 1834 cannot claim D. out of land disposed of by their husbands during their life or by will; and any partial encumbrance effected by a husband is good against D. See BAR OF DOWER, JOINTURE.

Dow'lais, a town in Glamorganshire, and a station on the Brecon, Merthyr, and Rhymney railways, 1½ miles N.E. of Merthyr Tydvil, is the seat of one of the largest ironworks in the world, the property of the Guest family. These works, which, with the collieries, employ 11,000 men, comprised (1876) 19 blast-furnaces, 140 puddling-furnaces, and 10 rolling-mills, and produce 150,000 tons of iron annually. Steel-making is also extensively carried on by Siemen's and Bessemer's processes. The town has a public library and literary institute. Pop. (1876) 19,000.

Dow'las, a coarse linen cloth which was widely used as a shirting before the introduction of calico, but has been almost entirely superseded for the purpose by that fabric.

Dowlat'abad ('Abode of prosperity'), a fortified town of India, in the territory of the Nizam of Hyderabad, on a tributary of the Godavari, 15 miles W. of Aurungabad, and 165 E.N.E. of Bombay. It is now in part deserted, and has but little trade. A strong isolated rock-fortress, 500 feet high, commands the town. Pop. about 8000.

Down, a maritime county in the S.E. of the province of Ulster, Ireland: greatest length about 50 miles, greatest breadth 38; area, 957 sq. miles, of which more than a half is under tillage, and nearly a third in pasture. The coast-line of 67 miles is indented by the inlets of Belfast Lough, 3 miles broad and 15 deep; Strangford Lough, 10 miles deep, with a breadth varying from ½ to 3 miles; and Dundrum and Carlingford Bays. The S. of the county is occupied by the Mourne Mountains, which rise in Slieve Donard to 2796 feet, while a smaller group occupies the centre. With these exceptions the soil is for the most part level, and tolerably fertile, especially on the banks of the streams, which, as well as the lakes, are generally small. The Upper Bann and the Lagan are the principal rivers. Oats, wheat, barley, potatoes, turnips, mangold-wurzel, and flax are the principal crops; linen is the chief manufacture, much of which is woven in the houses of the small farmers; and there are numerous flax and cotton mills. The principal exports are grain, dairy produce, pork, and hides, with hosiery, cotton, leather, thread, and coarse woollens. The chief towns are Downpatrick, Newtonards, Newry, and Donaghadee. The county returns two members to Parliament, the borough of Downpatrick one; and D. contains besides parts of three parliamentary boroughs—Belfast, Lisburn, and Newry. Pop. (1871) 293,449, of whom 122,841 were Presbyterians, 91,378 Roman Catholics, and 65,650 Protestant Episcopalians. See Knox's *History of the County Down* (Dub. 1875).

Down'ham Market (Old. Eng. *dun*, 'a hill,' and *ham*, 'a dwelling'), a town in the county of Norfolk, on the right bank of the Ouse, 40 miles W. of Norwich, with a bell-foundry and a mustard manufactory. It was long celebrated for its butter-market, which has now been removed to Swaffham. It has also a large horse-fair. Pop. (1871) 2752.

Down'ing College, Cambridge, founded by Sir George Downing, of Gamlingay Park, whose will, dated 20th December 1717, directed that on the failure of certain relatives to whom his estates were devised in succession, these should be employed to found a college. The charter was received 22d September 1800, but the buildings were not ready for the reception of undergraduates till May 1821. The foundation consists of a master, a professor of law, and another of medicine, eight fellows, two of whom were resident, and one of these in orders. The non-resident fellows hold their fellowships for twelve years. In 1875 the number of undergraduates was 51.

Downpat'rick ('Hill of Patrick'), or **Down,** named from an intrenched *dun* near the cathedral, the capital of the county of Down, on the right bank of the Quoile, 26¾ miles S.E. of Belfast by the Belfast and County Down Railway. It is divided into the English, Irish, and Scottish quarters; the streets are steep, and the houses well built. Quoile Quay, about a mile from the town, can accommodate vessels of 100 tons burden. D. has manufactures of linen, soap, and leather, imports coal, iron, salt, and bark, and exports grain, cattle, pigs, and potatoes. It returns one member to Parliament. Pop. of parliamentary borough (1871), 4155.

Downs (Old Eng. *duna*, Ger. *dünen*, Fr. *dunes*, 'hills'), a word found both in the Teutonic and Celtic tongues, and applied to (1) the margin of sandhills commonly forming the strand of the sea, and (2) a tract of bare sandy upland only affording pasture. Locally the name is given in England to two parallel ranges of broad low hills running in an E. direction from the middle of Hants to the sea-coast, the S. D. terminating at Beachy Head, and the N. D. coming upon the sea at Dover. These ridges, neither of which exceed 900 feet in height, enclose the valley known as the Weald (q. v.). The well-known breed of sheep to which the S. D. give name attests the quality of the pasturage.

The *Downs* is also the name of a roadstead off the E. coast of Kent, between Deal and Ramsgate and within the Goodwin Sands. It is 8 miles long by 6 broad, and affords anchorage of from 4 to 12 fathoms.

Downton ('Hill-town'), an old town of Wiltshire, 6 miles S.E. of Salisbury, on the Avon, here divided into three streams. It has a grammar-school, a paper-factory, tanneries, and malting-houses. A conical mound still remains of its old castle. Pop. (1871) 3654. Near D. is the estate and residence of Standlinch, the gift of the nation to Lord Nelson's heirs.

Down-Tree, a name given in the W. Indies to *Ochroma Lagopus*, one of the *Malvaceæ* (sub-order *Bombaceæ*), the cork-wood of Jamaica, on account of its downy seeds being used to stuff beds, &c.

Doxol'ogy (Gr. from *doxologeō*, 'I give glory to'), a hymn of praise to God, of which there have been several in use in the Christian Church, viz.:—(1) The Little D., or *Gloria Patri*, the original form of which was 'Glory be to the Father, and to the Son, and to the Holy Ghost, world without end. Amen.' The words 'As it was in the beginning,' &c. (supposed to have been added

by the Council of Nice against Arianism), began to be used in the Western Church (except in Spain) in the 7th c. (2) The Great D., or *Gloria in Excelsis*, the angelic hymn of Luke ii. 14, which has been chiefly used in the Communion Service. (3) The Trisagion, or seraphic hymn of Isa. vi. 3, but varied from the original. (4) The Hallelujah, which was either a repetition of that word itself (= 'Praise the Lord'), after Rev. xix., or one of the Hallelujah Psalms. (5) The last paragraph of the Lord's Prayer (in Matt.). See Bingham's *Eccles. Antiq.*, Walcott's *Sacred Archæology*, &c.

Doyle, Richard, one of the greatest of English comic artists, was born, of Irish extraction, in 1826. He gained his reputation originally as a clever sketcher for *Punch*, in the 5th vol. of which (1846) appeared his first contributions. In 1850, however, he threw up a connection with this periodical that was bringing fame and fortune, on account of its attacks upon Cardinal Wiseman and Roman Catholics generally. D. illustrated the works of various well-known authors, including Leigh Hunt and Thackeray, and contributed to the *Cornhill Magazine* many sketches, *e.g.*, the 'Bird's-eye Views of Society.' He published *The Continental Tour of Brown, Jones, and Robinson* (1854); a Christmas-book, *In Fairyland: Pictures from the Elf World* (1869), and since then has devoted himself to water-colour painting.

Do'zy, Reinhart, a profound Oriental scholar, was born February 21, 1820, at Leyden, where he took the degree of doctor in 1844, and was appointed librarian of the Oriental MSS. belonging to the university, in 1850 extraordinary, and in 1857 ordinary, Professor of History. He established his reputation in the learned world by his *Dictionnaire détaillé des Noms des Vêtements chez les Arabes* (Amst. 1845). This was followed by a series of works which shed a wholly new light on the history of the Arabs in North-Western Africa and Spain during the middle ages. The chief are *Scriptorum Arabum Loci de Abbaditis* (3 vols. Leyd. 1846-63); the editions of Abd-ul-Wahid al Marre Koshi's *History of the Almohades* (Leyd. 1847); of Ibn-Badrun's *Commentaire Historique sur le Poème d'Ibn-Abdan* (Leyd. 1848), with introduction, notes, and glossary; and of Ibn Adhari's *History of Africa and Spain* (3 vols. Leyd. 1848-52). His masterpieces, however, are *Recherches sur l'Histoire et la Littérature d'Espagne pendant le Moyen-Âge* (Leyd. 1849, new ed. completely revised, 1860); *Analectes sur l'Histoire et la Littérature des Arabes d'Espagne* (2 vols. Leyd. 1855–61); and, above all, his *Histoire des Musulmans d'Espagne jusqu'à la Conquête de l'Andalousie par les Almoravides* (4 vols. Leyd. 1861). Later writings of D.'s are *Het Islamisme* (Harl. 1863), and *Die Israeliten zu Mekka* (Leips. 1864).

Drach'enfels ('Dragon's rock'), one of the *Siebengebirge*, or Seven Mountains, 8 miles S.E. of Bonn, rising 1056 feet above the Rhine, and crowned by a castle which commands a view as far as Cologne, 20 miles distant. The name is derived from the legend of a dragon, which inhabited a cave within it, and was killed by the hero of the *Nibelungen Lied* (q. v.).

Drach'ma, Drachm, Dram (Gr. *drachmē* or *dragmē*, 'a handful') was a weight, and also the principal silver coin of the Greek currency. Of the D. there were two standards of different weights and values—the Attic and the Æginetan. The former was chiefly in circulation in Northern Greece, the maritime states, and Sicily, and was equal to about 9¾d. English money; the latter was used in Bœotia, in parts of Northern Greece, and in all the Peloponnesian states except Corinth, and averaged about 1s. 1¾d. In either case the D., which always consisted of 6 obols, was the 100th part of a mina, and the 6000th part of a talent. The mina and talent were not coins, but expressions of computation denoting the weight of the money. The D. varied in weight, under the different standards, from 65½ to 110 grains. Thus the mina at the lowest estimate = 15 oz., or nearly 1 lb. avoirdupois; at the highest = 1 lb. 9½ oz. avoirdupois. In the modern Greek currency the D. consists of 100 lepta, and = 8½d. sterling. The English avoirdupois D. = 27$\frac{11}{32}$ troy grains; the apothecary's D. = 60 troy grains, or a little less than the D. of the Attic standard. (Hussey, *Ancient Weights and Money.*)

Dra'co (Gr. *Drakōn*), a famous lawgiver of Athens, whose enactments, called *thesmoi* in contradistinction to the *nomoi* of Solon, were drawn up about 621 B.C. D.'s code was one of extreme severity, the punishment of death being affixed to almost every crime. Hence it was said that the 'laws of D. were those of a dragon' (Gr. *drakōn*), and 'that they were written not in ink, but in blood.' Their influence, however, was in the highest degree beneficial, inasmuch as the administration of justice was no longer arbitrary, but placed on a settled basis. Moreover, a most salutary result of his legislation was the establishment of the Ephetæ or court of appeal in cases of unintentional homicide. The extreme harshness of his laws, however, rendered them not only unpopular, but odious; and under Solon's milder code capital punishment was abolished in the case of all crimes save murder. Owing to the disfavour of his fellow-citizens, who deemed his laws rigorous beyond endurance, D. was obliged to repair to Ægina. Here he was received at the theatre with an enthusiastic welcome that proved fatal to him; for he was stifled by the garments that were showered upon him in token of respect and admiration.

Draco, a northern constellation filling the space between Ursa Minor and Ursa Major, Hercules and Lyra. γ Draconis, a star of the second magnitude, and the brightest in the constellation, is situated in the straight line joining Deneb and Arcturus, and is celebrated as the star by which Bradley discovered the aberration of light.

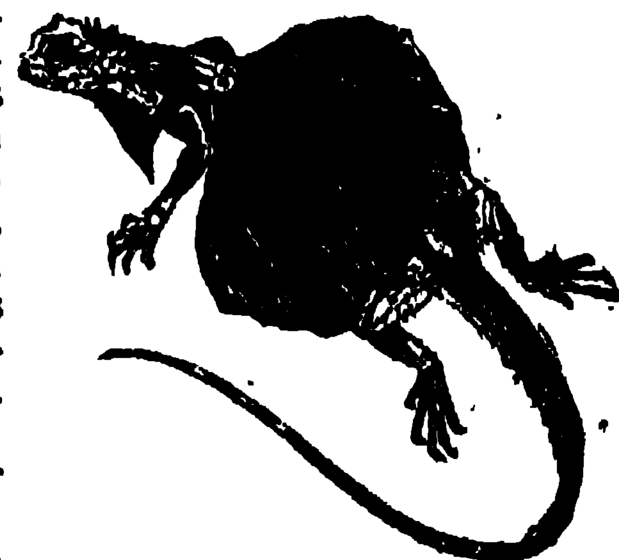
Dracon'tium, a genus of plants belonging to the Arum family (*Araceæ*), natives of the E. and W. Indies. The flowers of some, like those of the Arum family, have very disagreeable odours. One species, *D. polyphyllum*, has a powerful action on the nervous system, and is used in America for asthma.

Draft, in mercantile affairs, is a written order by a creditor addressed to his debtor calling on him to pay a certain sum to the drawer or to a third party. Acceptance (q. v.) completes the transference of the debt from the drawer to the payee.

Drag, an apparatus used for increasing the friction of a vehicle upon a road, so that in going down hill its speed may be easily controlled, and it may not press upon the horses. In its most common form it consists of an iron slipper which can be placed under one of the wheels (upon the road), and is attached by a chain to the body of the vehicle. It is now for almost all fast-running carriages superseded by a Brake (q. v.), which can be applied instantaneously by the driver's hand or foot.

Drag'oman (Fr. *drogman*, Ital. *drogomanno*) is a very old word. It probably comes through the Spanish form *torsimanni* and *trujaman*, from the Arabic *tardjemān*, 'an interpreter.' The Low Latin form of the word was *turchimannus*, the Low Greek *dragoumanos*. The French chroniclers Villehardouin and Joinville mention an officer named 'drughemant,' whose business it was 'enromancer,' or to put into French, the Saracenic despatches. It is now applied generally to the guide or interpreter in the Levant districts, but specially to the official interpreter attached to foreign embassies or the consular service in the Turkish empire. The D. is a recognised function in the elaborate training system of the French consulate. The D. frequently represents the consul in courts of justice when cases are being tried which affect the consul's fellow-countrymen. The British system of Chinese interpreters much requires extension.

Drag'on, in zoology, a name used (when qualified by the adjective 'flying') to denote certain Lizards (q. v.), such as the *Draco volans* of the Eastern Archipelago, which can sustain themselves in the air by means of a parachute-like expansion of the skin, supported on certain of the specially-extended front ribs. The name Great D. is also given to another species of lizard (*Ada Guianensis*) inhabiting tropical America, and from 4 to 6 feet in length. Certain fishes (*e.g.*, the *Pegasus draco*) are named sea-dragons, from their weird looks, and are included in the order *Teleostei*.


Draco Fabrimitus.

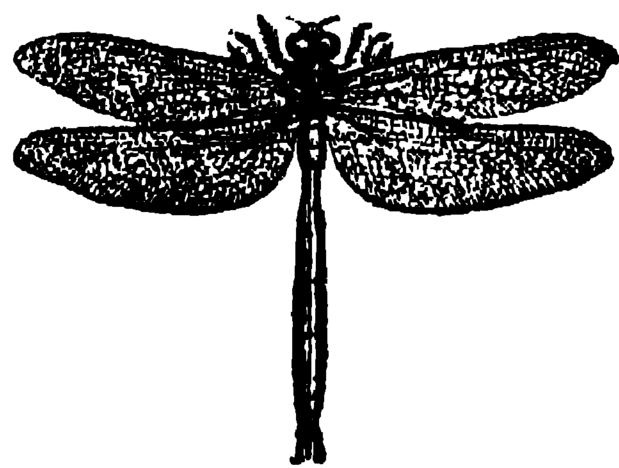
Dragon (Gr. *drakōn*, 'the keen-sighted'), in Greek mythology, a monster which may be regarded as the symbol of anarchy,

and to contend with which was the task of heroes. Hercules, Apollo, and Perseus are all represented as slayers of dragons. The D. was a favourite fiction of the Greek poets; a D. kept the garden of the Hesperides, and the chariot of Medea was drawn by dragons, these animals, from their clearness of vision, according to the solar myth, being supposed to bear the sun through the heavens. In the Vedic mythology the D. Vritra is the antagonist of Indra. In the *Nibelungen Lied* the D., as in the Greek mythology, was a destructive agency which the hero set himself to cope with. In the Apocalypse the angel lays 'hold on the D., that old serpent, which is the devil.' Hence painters and sculptors often represent the triumph of Christianity over unbelief by a D. transfixed or trodden under foot. The most familiar instance of this is the picture of St George and the D. It was a common emblem on the shields and banners of the Teutonic knights who first settled in England. The Celts selected the D. as the emblem of sovereignty, and in Christian art it was emblematic of sin. In heraldry the D. is a common emblem, and when other animals are represented as dragons behind, they are technically known as *dragonnés*. See Max Muller's *Comparative Mythology* in *Oxford Essays* for 1856, and Cox's *Manual of Mythology* (1867).

Dragon Blood, or **Gum Dragon**, a resinous exudation from the trunks of trees of various orders. Most of it is obtained from *Pterocarpus draco*, a leguminous tree of S. America, and from the red sandal-wood tree (*P. santalinus*) of the E. Indies. It is also yielded by *Dalbergia monetaria* of Guiana, and in Mexico by the euphorbiaceous *Croton draco*. Some is obtained from the dragon tree of the Canaries. It is found in the caves of the Guanches or ancient inhabitants of these 'fortunate isles,' and is believed to have been used in embalming. It is not now known in America. D. B. is soluble in oils and turpentine; it enters into the composition of some of the most esteemed varnishes, is used for dyeing horn the colour of tortoise-shell, in the composition of tooth-powders, various tinctures, &c. It is not now used in medicine. *Dæmonorops draco* (*Calamus draco*), a native of the Malay Islands, yields also D. B., hence it is known as the D. B. palm. The resin exudes from the ripe fruits, while inferior kinds are got by boiling the fruits after they have been shaken.

Drag'onet (*Callionymus*), a genus of Teleostean fishes, belonging to the family *Gobiidæ* or Gobies, and distinguished by having the ventral fins separate and distinct, two dorsal fins, and one small gill-opening on each side. The Gemmeous D. (*C. lyra*), also known as the foxfish, sculpin, and gowdie, is a familiar species. Its length is from 10 to 11 inches, and is dazzling in colour, being yellow on the upper and white on the under parts. The first rays of the dorsal fin are greatly elongated.

Dragon-Fly (*Libellula*), a well-known genus of *Neuropterous* insects, forming the type of the family *Libellulidæ*, which is known by the large globular head, the long abdomen, and the deep thorax. The antennæ are very short, and the mandibles or larger pair of jaws are highly developed. The variegated D.-F. (*L. variegata*) is a common species, as also the *L. cancellata*. These insects are familiar to all from their bright azure hues, the large size of their wings, and their peculiar gyrating flight, usually near pools of water. The French have named them *demoiselles*, from the grace and agility of their movements. They undergo a hemimetabolic or incomplete Metamorphosis (q. v.). The larvæ are aquatic, and appear as active grubs, provided with a powerful masticatory apparatus, like a 'mask,' with which they war on weaker insects. They breathe by means of branchiæ or gills in the hinder part of the body; the water which has been used in breathing being forcibly ejected from this cavity, and thus propels the larvæ forward. After passing ten or eleven months in the larval and chrysalis states, the insect usually attaches itself to some water-plant, and as the larval skin splits along the back, the perfect winged insect emerges therefrom, and after drying its wings, launches forth into the air.


Æshna Grandis.

Dragon, Green, a plant belonging to the Arum family, with peculiar black fetid flowers, and a spotted stem, somewhat resembling the skin of a serpent; hence its name, and also its supposed virtue of curing the bites of serpents. It is a native of Southern Europe.

Dragonnades' (from *dragon*, 'a dragoon'), the name given to the forcible conversion of Huguenots to Catholicism by means of free quartering of soldiers upon them, which took place in the reigns of Louis XIV. and Louis XV. The Intendants Foucault and Bâville were the chief organisers of the movement in Poitou, Montauban, Béarn, and Languedoc; but the Catholic clergy, the pious Bourdaloue as well as the intolerant Fléchier, were its animating spirit. When in 1685 the Edict of Nantes (1598) and the Edict of Grace (Nîmes, 1629) were both revoked, the cavalry already quartered in the districts undertook to suppress the assemblies or conventicles (then pronounced to be illegal), and large districts being defined as 'insurrectionary,' they were authorised by Louvois to use every violence in carrying out the penal laws. One town in the Cévennes, St Hippolyte, paid 240,000 livres in three months for billeting (Benoît, *Histoire de l'Édit de Nantes*). The D. were continued, whenever soldiers could be spared, down to 1750. There was no formal Edict of Toleration till 1787.

Dragon Root, a plant of the Arum family, whose tuber is used in America as a stimulant of the secretions in chronic bronchitis and other affections of the chest, and also for ulceration of the mouth.

Dragon's Mouth. See Boca.

Dragoon' (Fr. *dragon*), a name originally given to a light horseman trained to fight on foot as well as on horseback; now applied in the British service to heavy-cavalry soldiers, who are armed with swords and breech-loading carbines, and who wear brass helmets. Dragoons were first raised in France in 1660 by Mareschal de Brissac. Markham (*Souldier's Accidence*, 1645) states that the dragoons of his time were armed with a 'faire dragon,' and Meyrick accordingly presumes that the soldiers took their name from their chief weapon. The *dragon* was a short firearm or carbine, and bore on its muzzle the worked head of the fabulous beast indicated—which was believed to spout fire.

Dragör, a town on the S.E. coast of Amager, a small island in the Sound, with a harbour for small vessels, and a pop. of about 2000, chiefly occupied in trading, fishing, linen-weaving, and bleaching. It is an important pilot-station, and the inhabitants collect much salvage. D. was an important place in the middle ages owing to the herring-fishery in the Sound.

Draguign'an, the capital of the department of Var, France, at the foot of the woody Malmont, on a tributary of the Argens, 45 miles N.E. of Toulon by railway. It is the seat of a court of the first instance, and of a communal college, and has a new courthouse, a hospital, a public library, a theatre, a botanical garden, and fine promenades. Its manufactures are chiefly wine, oil, silks, soap, leather, and brandy. Pop. (1872) 7625. D. is an old town, and was at one time strongly fortified.

Drain'age signifies cuttings in the ground to carry off superfluous water from the soil and subsoil. There are few subjects that have created more discussion than D., and of late years some have doubted its profitableness. Complaints have been made that in dry hilly regions, since D. was introduced, the fallen rain discharges itself too quickly into the rivers, swelling them inordinately, and thereby doing harm to low-lying lands. The general experience, however, is that D. has vastly increased the productiveness of land, turning marshes and barren clay-lands into fertile fields, and removing malaria from the atmosphere. The benefits from the draining of land were noticed in the days of Columella, but were not taken advantage of. Open drains and ditches have been in use from time immemorial, and in spite of scientific and practical teaching still exist to an unprofitable extent. On many farms in Great Britain the cuttings for conveying away water are uncovered, and consequently inefficient, as they fill with weeds, preventives of outfall. The arching over of many would cost comparatively little. The land reclaimed

would in the course of a twenty-one years' lease return at least 20 per cent. upon the outlay. The depth and width of drains are points not yet settled. The system of D. must depend on the nature of the soil. Deep drains are essentially necessary on clayey soils, not so much on friable or medium soils; neither in the latter need the pipes be so closely together. Drains made thirty years ago on very heavy clay land, only 12 feet apart, and 2 feet 8 inches in depth, filled with stones above the pipes, have been found to answer well; but those 42 feet apart, 5 feet deep, with 1-inch pipe have proved better. Deep drains take longer to remove the water than shallow, but the soil where 4 or 5 feet D. is practised is never liable to get sour. Drains less than 3 feet in depth are now eschewed by all practical men, so also is the placing of stones or gravel upon the tops of the pipes. To prevent the choking of drains, it is recommended that small pipes passing through fences or near trees should be of iron, as plants are sure to enter crevices in clay tiles. The tiles used now are not so uniform in size as formerly, but they are generally round with a bore of 2 inches in diameter, and a length of from 12 to 15 inches. Collars preventing the encroachment of weeds or efflux of water are used at the joinings. The profit to the farmer of draining heavy wet land, 4 feet deep, at from 24 to 45 feet apart, Mr Bailey Denton shows to be 7s. 6d. per acre. Drain-cutting has been accomplished with ploughs in some parts, but as a rule the spade prevails. These implements gradually narrow as they cut from the surface of the soil to the bottom of the drain. The main drain ought to be cut at the lowest level of the field. Into that its tributary tiles should discharge their waters right and left. Steam-ploughing has done much to eradicate the furrow-draining system. See Rev. Adam Dickson's *Treatise of Agriculture*; Stephen's *Book of the Farm*; Mechi's *How to Farm Profitably*; *Monthly Magazine*, 1798; Bailey Denton's *Draining*; Robertson's *Survey of Midlothian*, 1795.

Drainage Tubes are surgical appliances made of india-rubber or caoutchouc, of various degrees of thickness, and in some cases medicated with carbolic acid or other disinfectants. They are used to evacuate chronic abscesses or other collections of pus, as in empyema, when the surgeon considers it inadvisable to evacuate the pus by a free incision. They are introduced into the abscess by means of a trochar and canula, and tied so that the matter drains away slowly, either through, or more frequently along the sides of the tubes. D. T. are sometimes inserted into wounds to allow deep-seated matter to escape as soon as it is formed.

Drake, Friedrich, a German sculptor, was born at Pyrmont, June 23, 1805, and studied under Rauch at the Berlin Academy. His numerous works, which are chaste and massive, include statues (Jos. Jakob Moser in Osnabrück, a colossal Friedr. Wilhelm III. in the Berlin Thiergarten, and another in Stettin, Rauch and Schinkel in Berlin, an equestrian statue of King Wilhelm in Cologne, 1867, statuettes of the brothers Humboldt, of Goethe, &c.), groups (*e.g.*, on the Berlin Schlossbrücke), busts (Oken, Ranke, &c.), mythological works, and genre pieces.

Drake, Sir Francis, one of the greatest of English sailors, was born in the year 1545 at Tavistock in Devonshire. He was educated, at the expense of Sir John Hawkins, in Kent, whither his father, a zealous Puritan, had been forced to fly. He went to sea when very young, and made various coasting voyages, besides visiting the Continent, until, fired by the exploits of Hawkins, he joined that commander in an ill-fated expedition to the Spanish Main. D. returned in poverty, and vowed revenge on Spain, his inflexible hatred of which was fostered by his losses and his Puritanical training. He then made several cruises in the W. Indies, where he went through many wild adventures, and became a terror to Spain. In 1572 he pillaged Nombre de Dios, and, in the same year, from a 'high and goodly' tree in Darien, first saw the Pacific, and 'besought Almighty God to give him life and leave to sail once in an English ship on that sea.' In 1577 D. sailed from England for S. America with five ships and 162 men, passed the Straits of Magellan, till then untraversed by Englishmen, and plundered and destroyed all along the coasts of Chili and Peru. He sacked various ports, took the treasure-galleon which sailed from Lima, and then, his one remaining ship, the *Pelican*, being loaded with spoils in value of about £500,000, sailed boldly for the Moluccas, rounded the Cape of Good Hope, and anchored in Plymouth harbour, September 24, 1579. He was received with general enthusiasm, and was knighted by the Queen, and the *Pelican* was long preserved at Deptford. This voyage, though barren in geographical results, had a mighty moral effect, and emboldened D.'s countrymen for the coming struggle with Spain. In 1585-86, D. revisited the Spanish Indies, plundering Vigo on his outward voyage, sacking Santiago, and ravaging Carthagena and San Domingo. In 1587 when the Armada (q. v.) was about to sail, D., with thirty small vessels, entered Cadiz harbour, burnt a hundred storeships and galleys, then swept the coast to Cape St Vincent, destroyed four large castles, and ended by descending on Corunna. This gallant and skilful dash at the Spanish ports, which he called a 'singeing of the Spanish king's beard,' delayed the sailing of the Armada for above a year, and enabled Elizabeth to prepare her defences. In 1588 he served as vice-admiral, under Howard, in the fleet which drove back the Armada, a result largely due to D.'s splendid seamanship and fiery daring. Had not he been checked by Howard, the rout of the Spaniards would have been even more disastrous. On returning from an unsuccessful expedition to Portugal in 1589, he was made member of Parliament for Plymouth, which he provided with water by an aqueduct, 20 miles long, built at his own expense. In 1595 he set out for the W. Indies, but unfortunately quarrelled with and finally separated from Hawkins, who shared with him the command of the fleet. After a brave but unsuccessful attack on Puerto Rico, he burnt Rio de la Hacha, Rancheia, Santa Martha, and Nombre de Dios, when a disease broke out among his men, of which the great navigator died, December 27, 1595. More than any other man, D. was the founder of England's naval greatness, and the sincerity of his patriotism was shown in the readiness with which he sacrificed his wealth to aid in repelling the Armada. He was, says Fuller, 'chaste in his life, just in his dealings, true of his word, merciful to those that were under him, and hating nothing so much as idleness, contemning danger and refusing no toil.' See Barrow's *Life of Admiral Sir F. D.* (Lond. 1844), and Purchas's *Pilgrims*.

Dra'ma (Gr. *drama*, from *draō*, 'I act'), or **Dramatic Po'etry**, is essentially the poetry of action. Its form is dialogue. It differs from every other species of composition, whether epic, lyric, or descriptive, inasmuch as it seeks to place before the mind an impersonal representation, by the writer, of the actions of others in a series of scenes of animated discourse and lively movements, by which the story is vividly portrayed and naturally evolved as a changing and progressive phase of human existence. In colour, interest, intensity, and charm, it surpasses all other forms of poetry, for whereas these exhibit phases of thought or feeling or fancy, D. P. deals with action, which is life itself. The elements of the dramatic art are universal. In the lowest stages of civilisation we discern rude attempts to impart amusement by dramatic representation, and even among children we see the art in embryo—in the mimicry of their seniors, and in their celebrations of weddings and funerals.

D. P. is divided into *tragic* and *comic*. The former is characterised by earnestness, the latter by mirth. Instances of vigorous dramatic composition are to be found in the Hebrew Scriptures, *e.g.*, in Job and in the Song of Solomon; and also in the ballads of the Greek rhapsodists, who doubtless combined the functions of the actor with those of the bard: but we must seek the birth of the legitimate D. in the Greek festival of Dionysus. The enthusiasm peculiar to the worship of the wine-god was in itself calculated to develop the dramatic art. Both *tragedy* and *comedy* sprung up in Greece about 580 B.C. The origin of both terms has been disputed. Tragedy (from *tragos*, 'a goat,' and *ōdē*, 'a song') is variously explained as the song at which a goat was sacrificed, or for which a goat was the prize, or in the performance of which the actors were clad in goatskins. Some derive comedy from *kōmos*, 'a revel,' others from *kōmē*, 'a village,' and *ōdē*. It may thus mean either the *revellers' song* or the *village song*. The D., according to Aristotle, had its origin in the dithyramb, and in its earliest form seems to have been little more than a choral song by a rustic smeared with the lees of wine. By and by an interlocutor was added, who filled up the breaks in the song by a narrative. Down to the times of Thespis (536 B.C.) and Phrynichus (512 B.C.), tragedy made but little way. The former introduced regular dialogue, and made one entire story occupy the pauses in the chorus. Thus the chorus became in time subordinate to the dialogue. It was

not, however, till the appearance of Æschylus that the Greeks had a regular theatre. He gave the D. life and divinity, and invested it with pomp and splendour. His compositions are characterised by simplicity, harmony, and sublimity. Sophocles, thirty years his junior, and in the delineation of human nature perhaps his superior, strove in the serene contemplation of human destiny to portray ideal heroism, and to clothe all he touched with enduring loveliness and beauty. He added a third actor, and otherwise improved the stage. Euripides appealed rather to the sensibility than to the imagination of his audience. By metaphysical subtleties, eloquent disputations, startling effects, and scenes of suffering, he mars his work, while he lacks the serenity, grandeur, and religious awe which reign in Æschylus and Sophocles.

Greek comedy rose with Susarion, an itinerant mountebank (580 B.C.). Epicharmus and Phormes, according to Aristotle (Poet. sec. xi.), were the first to fashion fables, which originally came from Sicily; while Crates introduced them at Athens. The most famous names of this period, that of the Old Comedy, are Magnes, Cratinus, Eupolis, Pherecrates, and Aristophanes. Of these, the last is by far the greatest. The Middle Comedy includes about forty names. The most celebrated are Antiphanes, Eubulus, Anaxandrides, Alexis, Araros, Philippus, and Timocles. None of their works have reached us. In what respect the Middle differed from the Old Comedy, scholars are not agreed, and some critics reject this division. The New Comedy, which includes the names of Menander, Philemon, Diphilus, Apollodorus, and Posidippus, is a mixture of tragedy and comedy. It is a direct growth from Euripides, whom its poets regarded as their master. Of Menander and Philemon—he most celebrated—only fragments remain.

The Romans were not of a dramatic turn. Their earliest rude ideas of the art, and even their term for a player (*histrio*), were derived from the Etruscans; their farces (*Fabulæ Atellanæ*) from the Oscans; while the higher compositions of Livius Andronicus, Nævius, Ennius, Plautus, Cæcilius, Terence, Pacuvius, and Attius were either reproductions or adaptations of Greek originals. Of the comic writers, we can judge only by the extant works of Plautus and Terence. The plays of the former have a Roman vigour and freshness which impart to them, notwithstanding their Greek origin, a great amount of originality; but they are inferior to those of Terence in felicity and purity of language. Of the early period of tragedy we know next to nothing; among the lofty attempts of the Augustan age we learn that the *Medea* of Ovid was much admired. The dramas of Seneca, though often bombastic and turgid, scarcely merit the vituperation of Bernhardy and Schlegel, for they contain passages of great beauty, and are interesting as the only entire Latin tragedies extant.

For fourteen centuries after Seneca, the D. slumbered in Europe. Italy was the scene of its revival. In most European countries the mysteries, miracle plays, and moralities of the middle ages were the germ of the modern D. (See MIRACLE PLAYS.) In Italy, however, the new D. did not spring mainly from the mediæval religious plays, but was partly a result of the Renaissance, and partly a continuation of the comic theatre of ancient Rome. The Renaissance (q. v.) called forth pieces based on Seneca, Plautus, or Terence, couched at first in Latin, but dealing with contemporary history. These were common in the 14th and 15th centuries, and among the best writers of them were Mussato, Landovico, Bernardin, and Petrarch (q. v.), the founders of the Academic school. Gradually Latin was disused in dramatic works; comedies were written in Italian by Ariosto, Aretino, and Macchiavelli; and early in the 16th c. tragedy was inaugurated by Trissino's *Sophonisba* (1515). In antagonism to this learned school there arose a vigorous popular D., not a growth of the Renaissance, but a direct descendant from the *Mimi* and *Fabulæ Atellanæ* of ancient Rome, which had lingered through the middle ages in the rural districts of Italy, and in the 15th c. were known as *contrasti*, as *commedia*, and as *farsa* (see FARCE). From these *contrasti*, laughable impromptu dialogues, sprang the *commedia dell' arte*, or *scenarii*, farcical pieces, the plot of which was sketched before representation, while the dialogue was improvised by the actors. These became very popular, and helped to mould the rising comedy of France. The Italian pastoral D., which largely influenced English poetry (see ENGLISH LITERATURE), was quite aloof from the early religious plays, and purely a fruit of the Renaissance, springing from the ancient idylls, and aiming at a fanciful delineation of Arcadian and mythological scenes. The leading pastoral plays were Poliziano's (q. v.) *Orfeo* (1472), Tasso's (q. v.) *Aminta* (1513), and Guarini's (q. v.) *Pastor Fido* (1583). The pastorals gave birth to the Opera (q. v.). Comedy flourished richly in the 16th, but waned in the 17th c., the *commedia dell' arte* supplanting the *commedia erudita*, or Academic pieces, and tending to crystallise character into a few types, until, in the 18th c., Goldoni (q. v.) restored genuine comedy, and Alfieri (q. v.) reinstalled classic tragedy. Among later Italian writers of tragedy are Monti, Manzoni, and Niccolini.

The Spanish D. began with the great national movement at the close of the 15th c., and, unlike the Italian D., was wholly alien from the Greek and Roman theatre, but flowed through the *entremeses* or interludes from the Catholic religious plays, on which the *autos sacramentales* or devotional dramas of many famous authors were based, and from the old chivalrous ballads and epics, whence it drew its romantic colouring. The earliest true dramas are the *Mingo Rebulgo*, a satiric pastoral, written in the first half of the 15th c., and *La Celestina*, a kind of historic comedy, written about 1450. The Spanish D. was distinguished by a florid style, intricate plots, and a pervading glow of patriotic and religious fervour. The chief Spanish dramatists were Cervantes (q. v.), Lope de Vega (q. v.), and Calderon (q. v.). Second to these were Alarcon, Molina, Moreto, and Solis. The greatest recent dramatist is Moratin (q. v.).

The Portuguese D. arose in the 16th c. with Miranda, who followed Plautus and Terence; Ferreira, whose *Ignez de Castro* was modelled on Greek tragedies; and Gil Vicente (q. v.), the greatest dramatist of Portugal, who founded a Romantic school. Since Vicente, Portugal has produced no dramatist of very high merit.

The French D. was descended from the mediæval mysteries, &c., through the farces and *soties*, or satiric pieces of the 15th c. The best writer of *soties* was Pierre Gringoire, and one of the farces, *Pierre Pathelin*, is the earliest example of genuine comedy in French. The first tragedy was the *Cleopatra* (1552) of Jodelle, who, with his followers La Peruse and Garnier, imitated Seneca. In the 16th c., comedy, though still crude, was more vigorous than tragedy, being sprightly, fluent, and sarcastic. It was largely cast in octosyllabic verse, and its chief writers were Jean de la Taille and Larrevy. At the beginning of the 17th c. a romantic D. was arising in France, but Molière (q. v.), the greatest French dramatist, displaced the comedy of intrigue by the comedy of character and manners, and his contemporary, Corneille (q. v.), founded the French *classic* school of tragedy. This *classic D.*, which was brilliantly represented by Racine (q. v.) and Voltaire (q. v.), and which attained its zenith under Louis XIV., was marked by rigid adherence to the Unities (q. v.), by formal and often over-emphatic rhetoric; and, though generally wanting in passion and natural variety and freedom, possessed many noble reflective and declamatory passages, and great purity, stateliness, and finish of style. After the death of Voltaire, the French D. dwindled until the rise of the Romanticists (see ROMANTICISM), who, about 1830, led by Hugo (q. v.), founded a new school, after a bitter struggle with the Classicists. The best of the new romantic plays were, compared to the dramas of Corneille and Racine, less chaste and pale, more rich and turbid in diction, more flexible and musical in verse, wider in range of character, and more impassioned in its representation. The most recent French D. is deeply stained with lascivious sensationalism.

The German D. has had no continuous development, and has never displayed the bright luxuriance of the English and French theatres. In the 16th c. the religious plays, under the influence of Hans Sachs (q. v.) and Ayrer, expanded into a popular D., and in the 17th c. there was marked dramatic progress in Silesia. In the 18th c. an exotic school, imitative of the French D., arose, but was checked by Lessing (q. v.), who founded a realistic and impassioned national D. The greatest German dramatists since Lessing are Goethe (q. v.) and Schiller (q. v.). For the German romantic school, including Tieck, Arnim, Halm, Körner, &c., which chose Shakespeare as model, see ROMANTICISM.

The English D. was an outcome of the mysteries, &c., through the moralities and interludes of the 16th c. The first English comedy is Udall's *Ralph Royster Doyster*, the prototype of the numerous comedies of London life, acted before 1557, and the first tragedy is *Gorboduc, or Ferrex and Porrex*, acted in

1562. From 1580 to 1596 the chief dramatists are Peele, Greene, and Marlowe, and, secondary to these, Lodge, Kyd, Munday, Chettle, and Nash. Their works were bombastic, sensuous, and charged with lawless and fiery imagination. The mature Elizabethan D., represented by Shakespeare, Jonson, Beaumont and Fletcher, Dekker, Webster, Ford, and Massinger, blended an artistic beauty born of the Renaissance with an unrivalled strength of passion and wealth of thought kindled by the national energy and progress. Shirley links the Elizabethan with the Restoration D., in which tragedy sinks into rant, and poetic comedy gives place to a comedy of manners, shameless, vigorous, and sparkling with the clearest wit. The chief names of this period, in which French influences prevail, are Dryden, Shadwell, Lee, Crowne, Otway, Rowe, Congreve—'the English Molière'—Wycherley, Vanbrugh, and Farquhar. In the 18th c. tragedy declined, Johnson and Addison attempting it unsuccessfully; but spirited, humorous comedies were produced by Cibber, Colman, Cumberland, and especially by Goldsmith and Sheridan. In the 19th c. many writers have composed noble dramatic works, especially Shelley, Landor, Coleridge, Byron, and Taylor, which are not suited for representation. Joanna Baillie, Sheridan Knowles, Talfourd, Bulwer Lytton, and Westland Marston have sought to infuse poetry into acting plays; and among the poets who have recently adopted the dramatic form are Swinburne, Tennyson, Browning, and Nichol. The present acting D., which has suffered greatly from the ascendancy of spectacle and burlesque, is seen at its best in the realistic comedies of Robertson and Albery, the beautiful whimsicalities of W. S. Gilbert, the tragedies of Wills, the sensational plays of Wilkie Collins, and the farces of Byron. See Donaldson, *Theatre of the Greeks* (1849); Schlegel, *Vorlesungen über Dramatische Kunst und Literatur* (2d ed. Heidelb. 1817); Freytag, *Die Technik des Dramas* (Leips. 1865); Klein, *Geschichte des Dramas* (2 vols. Leips. 1865); Ward, *English Dramatic Literature* (2 vols. Lond. 1875); and also ENGLISH LITERATURE.

Dramatic Works, Copyright in. By 3 and 4 Will. IV. c. 15, the author of any dramatic work has for life the sole control of its theatrical representation. Should he die within twenty-eight years from the date of publication, the right accrues to his assignee for the remainder of that period. The Act has been extended to musical compositions. See COPYRIGHT, LAW REGARDING.

Dramm'en, the third seaport of Norway, on the Dramsfjord, at the mouth of Drams-Elv, 30 miles S.W. of Christiania. It consists of three separate parts—Bragernas, Stromso, and Tangen, which are connected by bridges. Its manufactures are beer, tobacco, cordage, &c., and it has the largest timber-trade in Norway. In 1873 it exported 233,000 tons of various woods, chiefly to Germany, Holland, England, and France. There belonged to the port (1875) 245 vessels, of which only three were steamers. The value of the imports in 1873 was £33,940, of the exports £53,523. Pop. (1876) 18, 838.

Dra'per, John William, LL.D., an American savant, was born at Liverpool, England, May 5, 1811, emigrated to the United States in 1833, and graduated in the University of Pennsylvania in 1836, in which year he was appointed Professor of Chemistry in Hampden and Sydney College, Virginia. In 1839 he became Professor of Chemistry in the University of New York, and two years later assisted in starting the University Medical College of New York, with which he was connected till 1868. His chief works are *Organisation of Plants* (1844), *Text-Book of Chemistry* (1846), *Natural Philosophy* (1847), *Human Physiology* (1856), *History of the Intellectual Development of Europe* (1863), *Future Civil Policy of America* (1865), *Philosophical History of the Civil War* (1867), and *The History of the Conflict between Religion and Science* (King & Co., Lond. 1874).

Dra'pery (Fr. *drap*, 'cloth'), in painting or sculpture, the clothing of the human figure. The fit disposition of D. is an important object in art, and in modern times, from the comparatively unbecoming nature of dress, offers considerable difficulties to the artist. This difficulty is sometimes eluded by draping a figure in antique costume, or in a loose cloak, but many great sculptors, and notably Thorwaldsen, have coped successfully with the disadvantages of modern costume. In representing D., attention must be paid to historic accuracy in the dress painted or chiselled, to the action represented, and to the outlines of the figure covered by the D. The object of the sculptor is to impart to D. a conventional repose and a firmness that does not prevent it from being transparent and flowing. See COSTUME and FASHION.

Draught or **Draft** of water of a vessel is the depth to which she is immersed when afloat. A scale of feet is marked at one or both ends of the ship, by which the D. can be at once known at any time.

Draughts (Fr. *les dames*, Ger. *damenspiel*), a game played by two persons on a board similar to that used in chess. Each player has twelve 'men' or pieces, one set being black, the other white. These are placed on the white (in Scotland on the black) checks, occupying at the beginning of the game the first three rows before each player. They are moved forwards in a diagonal or zigzag direction, and only one square at a time. When a piece has safely reached the adversary's end of the board, it is made a 'king,' being crowned with another piece for the sake of distinction, and thenceforth having the additional power of moving backwards. The sole object of the game is to capture or 'take' the opposing 'men,' or to hem them in so as to hinder further progress. A piece can only be taken, *i.e.*, conveyed from the board, when it is placed immediately in the way of another, and a check behind it is left blank. The victorious piece is then lifted over the one taken and placed in the empty square beyond. As a general rule, in playing, it is best to concentrate one's forces, and to keep none of the men 'at home.' Success greatly depends on getting an early king. D. is less scientific, but more popular than chess, to which it holds much the relation of bagatelle to billiards. It has been said that 'life is too short for chess,' but a game at D. occupies little time, and is a recreation, not a study. See *Handbook of Games for Gentlemen* (Lond. 1876).

Drave, or **Drau,** one of the chief tributaries of the Danube, rises in the Pusterthal on the S.E. frontier of the Austrian Tyrol, flows E. through the crown-lands of Carinthia and Steiermark, and E.S.E., forming the boundary between Hungary on the N. and Croatia and Slavonia in the S., to its junction with the Danube, about 10 miles below Essek. It is 382 miles long, and becomes navigable at Villach, in Carinthia, whence downwards there is considerable traffic.

Dravidian Languages and Peoples. The term D. has been applied by philologists to a group of cognate languages, whose present home is almost entirely confined to the S. of India. The name itself is derived from *Dravira*, the Sanskrit appellation for the Tamil country, the most ancient and powerful of the Southern Indian kingdoms; and the name Tamulian has been sometimes used for the entire group. The D. L., which all conform to a common type, belong to the more highly-developed stage of the so-called Turanian family of speech. They are agglutinative in the fundamental portions of their grammar; but they also exhibit incipient inflections, which can for the most part be reduced to separate words incorporated with the roots. Their alphabet is manifestly derived from some prototype of the Devanágarí character; but it differs from the Sanskrit proper in being rounded rather than angular, and cursive rather than either inscriptional or capital. The D. group of languages, which comprises five chief members, has been subdivided by Professor Wilson into the two following branches:—(1) Telugu, Carnata or Canarese, and Tuluva; (2) Tamil and Malayálam. Telugu is spoken by about 14,000,000 people in the N.E. of the Madras Presidency; this language is the sweetest of the five, but its literature is composed of translations from the Sanskrit. Carnata is spoken in the Carnatic and the State of Mysore by about 5,000,000; its literature, though recent, is partly original. Tuluva, which is largely mixed with the Carnata, is spoken by only some 150,000 persons, living on the western coast between Cochin and Goa. Tamil is spoken by about 10,000,000, who live in the tract between Madras city, Cape Comorin, and Mysore; it boasts an indigenous literature, cultivated as early as the 9th c., and the Tamil race is by far the most civilised and energetic of the D. peoples. Malayálam is spoken by about 2,500,000, inhabiting what is known as the Malabar coast, which runs up on the W. from Cape Comorin; nearly two-thirds of this language are said to be of Sanskrit derivation. Besides these five languages, it has lately been discovered that certain barbarous tribes in the middle of the peninsula use dialects which can certainly be referred to a D. type. Among these are

the Gondhs of Central India, the Kandhs of Orissa, the Uraons of Chota Nagpore, and the Rajmahalis bordering on the Ganges; these number collectively nearly 3,000,000. It has also been conjectured that other tribes, dwelling as far N. as the slopes of the Eastern Himalayas, are D. in origin, though no longer so in language. It is probable, therefore, that one-sixth of the total population of India is D. See *A Comparative Grammar of the Dravidian and South-Indian Family of Languages* by the Rev. R. Caldwell, LL.D. (2d ed. Lond. Trübner & Co. 1875).

Draw'back is used in commerce to denote the paying back on exportation of duties previously paid on commodities. It thus allows the commodity to be sold at its natural cost; while a bounty enables the exporter to sell below natural cost. The object of the D. is that commodities on which taxes fall may be exported for sale abroad as if they had not been taxed. It is therefore defended by Adam Smith as remedying the inequalities of taxation varying in different countries; otherwise peculiar facilities of production would be required to compete against a commodity produced and not taxed abroad. The system of warehousing imports for exportation does away with D., because it avoids taxation. In certain cases the D. exceeds the tax, and then forms a bounty. The Act 16 and 17 Vict. c. 107, provides that persons intending to claim D. shall give notice to the officer of excise; that no D. shall be paid on goods less in value than the D. claimed, or upon tobacco not wholly manufactured from imported tobacco; that goods relanded after D. has been paid for exportation shall be forfeit, as well as the ship from which they were relanded. Great difficulty is often caused by the experiments to determine the gravity of samples of beer for exportation, on which the amount of D. depends. See also DEBENTURE and IMPORTATION.

Draw'ing, the art of representing objects or natural scenery in black and white or in colour upon a flat surface. In ordinary parlance a D. is a representation of an object or series of objects in outline, with or without lights and shadows, and executed in pencil, chalks, sepia, or Indian-ink. In the constructive arts, a D. is a preparatory plan in which the proportions of a machine, building, &c., are accurately set out for the guidance of the constructor. In art, the term has a much wider signification. A water-colour D. may be a highly-finished painting in which no *drawn lines* appear. The term D. is also applied to a preparatory study or sketch in oils of a subject, or part of a subject, to be afterwards worked up into a finished picture in oil-painting. Elementary D. is now regarded as an essential branch of primary education, and as such is taught in all schools, while in the army, and in many professions and trades, the ability readily and graphically to delineate common forms, plans, sketch-maps, scenery, &c., is regarded as an accomplishment second only in importance to writing. D. defines the forms of objects by means of outline and shadow, and renders the relation between near and distant objects apparent by the help of Perspective (q. v.). According to Greek fable, a girl who drew the outline of the shadow of her lover's profile on a wall created the art. Ardices and Telephanes are said to have been the first to have indicated the roundness of the figure by the process of hatching. Monochrome, or drawing in one colour, using tints of varying depths, is said to have been first practised by Philocles and Cleanthes. The invention of this process led the way to the use of various colours in the representation of objects—in other words, to the art of painting. Among the Greeks, D. was studied rigorously and thoroughly. Pamphilus, the instructor of Apelles, required his pupils to study the art ten years. D. is the basis of all art, and while it is all-important at the commencement of an art training, it is little less so at all succeeding stages. In D., to a far greater degree than in colour, the expression—the soul, so to speak—of a picture or other work of art consists. Without D., colour has no intelligence. As the greatest merit, therefore, of the greatest work of art resides in the quality of its D., it is manifest that a thorough knowledge of the principles of the art and a perfect training in its practice is indispensable to success in high art. In teaching D., the prevalent practice in the schools of the Continent, namely, to teach the pupil to represent nature by means of light and shade, rather than, as with us, by rigid outline, is undoubtedly the preferable method, rigid outline, except in the forms of crystals, &c., being in nature practically unknown. An excellent work on D., as applied to the ornamental arts, has recently been written by E. S. Burchett, lecturer on geometrical and perspective D. at the National Art Drawing School, South Kensington. See Ruskin's *Elements of D. in Three Lessons for Beginners* (Lond. 1857).

Drawing and Quar'tering, the form of capital punishment, still legally in force, for Treason (q. v.), is that the criminal shall be drawn on a hurdle from gaol to gallows, and hanged; and that afterwards the body shall be divided, and then quartered. It is the privilege of the sovereign to change the punishment of D. and Q. into beheading.

Drawing-Board, a board upon which paper is fixed in order that it may be drawn upon. For many engineers' drawings the paper is merely attached to the board by drawing-pins or by sealing-wax; but for more elaborate drawings, or for water-colours, the paper is attached by glueing all round while damp. The glue hardens very rapidly, and the paper, as it slowly dries and shrinks, is stretched perfectly smooth and flat.

Draw-Plate, a steel plate, having in it a series of holes gradually diminishing in size, through which metals to be formed into wire are drawn.

Drayton-in-Hales, or **Market-Drayton**, a town in Shropshire, on the Fern, 19 miles N.N.E. from Shrewsbury, and 153 miles N.W. from London. It is an old town, and is supposed to be the *Caer-Draithon* of the Romans. The parish church was built in the reign of Stephen. D. has manufactures of paper and haircloth, markets on Wednesday and Saturday, and several fairs in the year. Pop. (1871) 4039.

Drayton, Michael, an Elizabethan poet, was born at Hartshill, near Atherston, Warwickshire, in 1563, and is said to have been educated at Oxford, but little is known of his life. He produced *Harmonie of the Church*, his first work, a paraphrase of parts of Scripture, in 1591; *Idea: Shepherd's Garland fashioned in Nine Eclogues*, in 1593; *Idea's Mirror, Amours in Quatorzains*, a number of sonnets, and the tale of *Endymion and Phœbe*, in 1594; *Mortimeriados*, afterwards recast under the title of *The Barons' Wars*, in 1595; *England's Heroical Epistles* in 1598; *Polyolbion* in 1612-22; and *The Battle of Agincourt* in 1627. He died Dec. 23, 1631, and was buried in Westminster Abbey. D. was a true poet, but forfeited popularity by the prosaic theme and tedious length of his chief work, the *Polyolbion*, a metrical guide-book to England and Wales, in buoyant Alexandrine verse, and full of noble patriotic and descriptive passages. *The Battle of Agincourt*, a fiery, vivid lyric, one of the finest war-poems in the language, is said to have been the model of Campbell's *Battle of the Baltic*. The most charming of D.'s works is *Nymphidia, a Tale of Faery-land*, wrought with the nimblest, brightest fancy, abounding in delicate oddities of conception and choice touches of colour. See Hooper's edition in 6 vols. of *The Complete Works of Michael D.*, of which 3 vols. had appeared in 1876.

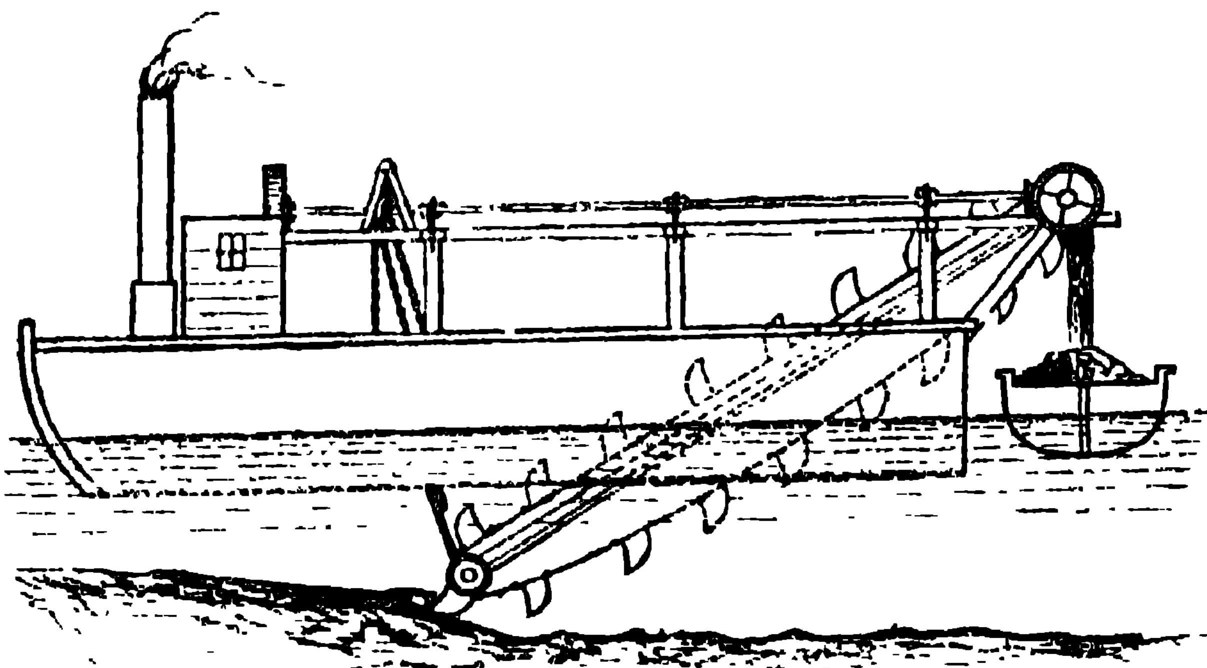
Dream'ing is the activity of the mental faculties, more or less, during sleep. Some suppose that even in the most profound sleep we dream, although the dreams may not be remembered. Of this there is no proof, and, on the contrary, it is highly probable that in profound sleep the cerebral centres, on the activity of which all our mental states depend, are in a state of complete rest. Others suppose that D. is a mark of imperfect sleep. Usually in D. there is a less complete exclusion of sensory impressions than in deep sleep, and thus the dream may be influenced by external impressions, although the mind is not conscious of them as such. In D. the cerebrum is partially active, while the sensorium, or that part of the nervous system which is the first recipient of impressions on the senses, is capable of being excited, not only by impressions on the sense-organs, such as eye and ear, but by inferences transmitted to it by the cerebrum. In D. there is no volitional control over the current of thought, and there is usually an utter want of coherency in the images that appear before the mental eye. Nor does this excite any surprise in the dreamer. In D., also, trains of thought pass through the mind with great rapidity, so that, during a few minutes, events happen which in the waking state might occupy hours or even days. Time seems to be abolished. In D. sometimes sensibility to external impressions may be entirely suspended, and sometimes not. In the latter case, suggestions may be made to the mind of the dreamer, as by whispering into his ear. To such an extent may this be done, that the train of

thought of the dreamer may be controlled by others, and he may even be made to act his dreams by speech or muscular movements, while all the time he is quite unconscious of any such suggestions, and may have no recollection of them when he awakes. Such forms of D. may be regarded as transitional to the state of Somnambulism (q. v.).

Dredge, a kind of net for dragging or sweeping the bottom of the sea, lakes, or rivers, and retaining the animals, &c., that enter it. The oldest and most familiar form of D. is that important item of deep-sea fishing-gear, the oyster-D. The zoologist's D., a most valuable implement of scientific research as regards marine fauna, differs from it in size and detail. The open frame takes a pyramidal form, at its base are two iron scrapers, and suspended from them a bag of closely-netted twine, enclosed in an outer net of hide.

Dredging in deep-sea and scientific exploration has of late years assumed a high importance, as making us acquainted with the fauna or life of deep-sea areas. Dredging may now be carried on at a depth of four or more miles, the chief obstacle to the descent of the D. (viz., the action of the strong under-currents, which tend to sweep the D. away from the ship in the direction of the surface) having been overcome through the use of heavy weights, which are attached to the D.-rope at intervals, and which thus gradually pull the machine to the ground. The equipment of a scientific dredging expedition is no light matter, as may be learned from a perusal of Professor Wyville Thomson's work, *The Depths of the Sea* (Macmillan, Lond.), in which full details as to the management of the D. in deep water, as well as other interesting information regarding deep-sea exploration, will be found.

Dredging Machine. A mechanical contrivance for raising mud, sand, &c., from the bottom of a river, dock, harbour,



Steam Dredging Machine.

or canal, for the purpose of facilitating navigation or constructive operations. The most simple apparatus is the bag-and-spoon dredger, consisting of a large spoon shaped frame, with a leather bag suspended from it, attached to a long pole. It is raised by means of a winch, a chain being attached to the spoon. For deepening canals in Holland, or for excavating for pier-foundations, &c., this dredger is much resorted to. For deepening the bed of a river and maintaining an open channel for large ships, or for cutting the bar of a river, the steam dredger with a chain-and-bucket system is invariably employed. The annexed cut shows its general features. A movable frame or ladder carries an endless chain with a series of buckets attached. The buckets, full of material, ascend on the upper side of the ladder, and as they turn the cam at the top to descend on the under side, they empty their contents into a barge beneath. In some dredging vessels the bucket system is worked through an opening amidships, in others over their extremity. Some vessels have a double bucket system, working on each side. Large dredges are fitted with a screw propeller, and some are capable of raising 500 tons of silt per hour. An ingenious method of dredging was recently patented, in which hydraulic power raises the dredged material. Two pipes, descending one on each side of a boat, are joined at their lower ends by a curved pipe with an open rake-shaped mouthpiece. By the forward movement of the boat, mud, shingle, &c., are forced into the mouthpiece, and are impelled with great speed up through the discharge-pipe by water forced down the other pipe.

Dren'the, the least populous province of Holland, between the Hannoverian frontier and the Zuyder Zee. Area, 1017 sq. miles; pop. (1877) 113,773. The surface is in great part sandy waste, alternating with bleak stretches of morass. The province is traversed by the D.-Hoofd and Oranje canals, and by two lines of railway. Little or no wheat is cultivated, but there is much cattle-rearing, bee-culture, and peat-digging. Four Government industrial colonies have an aggregate pop. of 10,000. Assen, the capital, has a pop. (1876) of 4325.

Dres'den, the capital of Saxony, is beautifully situated on both banks of the Elbe, 110 miles S. by E. of Berlin, and 78 N.N.W. of Prague. It is divided into the *Altstadt* and *Friedrichstadt* on the left, and *Neustadt* and *Antonstadt* on the right bank of the Elbe, which is here crossed by the splendid old Augustan bridge of seven arches, and by the new iron railway (or Marien) bridge. The city has several squares, gardens, and promenades, as well as the famous Bruhl Terrace overhanging the river. It is a great centre of culture, standing high in musical science, and having earned the name of the 'German Florence' on account of its rich art-collections. Its principal buildings are the uncouth Royal Palace (begun 1534), with its green domes and its rare collection of precious stones and gold and silver work; the Zwinger Palace, containing a museum of natural history, a splendid cabinet of engravings, and a collection of tools and mathematical instruments; the world famous Museum or art gallery; the Japanese palace, remarkable for its royal library of 305,000 volumes, and for its porcelain and classical antiquities; the Frauenkirche, with a tower of 335 feet; the Catholic Hof Kirche; a Jewish synagogue; the New Royal Theatre (1878) one of the finest in Europe; an arsenal; and orangery. The D. picture gallery contains about 2000 works, chiefly of the Italian and Flemish schools. Of the former, Raphael's 'Sistine Madonna,' Correggio's 'La Notte,' and Titian's 'Venus' and 'Tribute-Money,' are the most celebrated specimens; there are also pictures by Francia, Paul Veronese, Giulio Romano, Leonardo da Vinci, Bellini, Perugino, the Caracci, Guido Reni, &c. The Flemish collection is singularly rich, embracing 41 specimens of Rubens, 21 by Vandyck, many of Rembrandt, Snyders, Breughel, Ruysdael, Gerard Dow, and Teniers. Among the other more notable names represented are Holbein, Poussin, and Claude Lorraine. D. has a fine-art academy (1764), many good schools and public institutions, some light industries, and an extensive trade on the Elbe. It is the convergent point of five railways. To the S. of the city lies the romantic and picturesque region known as 'Saxon Switzerland.' Pop. (1872) 177,089.

The oldest portion of D., the Sorben colony, is known to have existed as early as 1206. In 1485 it became the residence of the Albertine line. The Reformation was here welcomed by Heinrich the Pious, 1539. The town, which had been burned in 1491, was in great part newly built under August II. and August III. By the Peace of D., the Austrian War of Succession was brought to a close, 26th December 1745. Its fortifications were begun in 1810, and three years later followed the Battle of D. (q. v.). In the revolution of 1849 the city suffered much from barricade struggles. The D. Conference for remodelling the constitution of the German 'Bund' sat from 23d December 1850 to 15th May 1851. The Prussians occupied D. in the Austro-Prussian war of 1866. See Gottschalk, *D. und seine Umgebungen* (10th ed. Dresd. 1866); Klemm, *Chronik von D.* (1847); Lindau, *Geschichte der Stadt D.* (2 vols. 2d ed. 1863); and *Dresdener Galeriebuch* (2d ed. 1856); Schäfer, *Führer der königl. Gemäldegalerie zu D.* (1864).

Dresden, the Battle of, was the last of the great victories of Napoleon. This city, the central point of the French operations in August 1813, was held by St Cyr with some 30,000 troops, when the allied army unexpectedly appeared on the 23d. But the advantage of a surprise was thrown away. The Austrians delayed action till the arrival of Klenau's left wing. On the 26th the attack began, but that morning Napoleon, who had been in Silesia, reached D. with his Guards. The assault, though brilliant, was repulsed, and after two days' fighting, the allies retreated on the night of the 27th. On quitting the city (7th October) Napoleon left there some 30,000, who were besieged by the

Russians, and who, after a period of misery and famine, capitulated, and were made prisoners of war.

Dress. The influence of D. on health is very great, and generally underrated, especially by women. In mild weather in winter, say during a temperature of 50° in January, complaints are rife that the weather is *relaxing*, those complaining being dressed precisely in the same way as they would be were the temperature 20° lower. They dress according to the season, not according to the temperature. Now, seeing that days in January may be as warm as mild ones in April, and days in May may be as cold as January, while one day in January differs by 30° from another, the error is so obvious that it is strange that it should require to be pointed out. There is probably no surer indication of a woman having good sense than when she dresses as rationally as she can without opposing Fashion (q. v.) too strongly, preferring simplicity and good taste to show and extravagance.

Dreux, a town of France, department of Eure-et-Loire, on the river Blaise, 45 miles W. of Paris. It has manufactures of serge and coarse cloth, tanneries, iron-foundries, and dyeworks, and a trade in grain and cattle. Pop. (1872) 6197. D. was the scene of a battle in 1562, in which the Huguenots were defeated, and their leader, the Prince of Condé, taken prisoner. The ruins of the ancient castle of the Comtes de D. contain a fine chapel, built by Louis Philippe as a burying-place for the Orleans family.

Drey'se, Johann Nicolas von, the inventor of the needle-gun, was born at Sömmerda, near Erfurt, November 22, 1787. From 1809 to 1814 he worked in the imperial armoury, Paris. Thenceforth he devoted himself to the manufacture of fire-arms, and in 1827 produced the first model of a needle-gun, an invention which he afterwards developed, and which, in 1840, was adopted in the German army. D. was placed at the head of a large manufactory of fire-arms in Sömmerda, and appointed a privy-councillor. He died December 9, 1867.

Driff'ield, Great (Old Eng. *Driffelda*), a market-town in the East Riding, York, 196 miles from London by rail. It stands in a fertile district at the foot of the Wolds, and consists mainly of one street. The chief buildings are the corn-exchange, the mechanics' institute, and All Saints' Church. D. has manufactures of wool and cotton, and several foundries, and flour and bone mills. Several tumuli have been found in the neighbourhood. Pop (1871) 5067.

Drift, a name applied in various senses in geology. Thus it may be used to denote sand and other loose matters which have been blown by winds, and which have been collected together to form 'sand-dunes.' These 'drifted sands' become consolidated by the growth in them of various hardy grasses, such as the sand-grass (*Carex arenaria*). Sand-dunes are most common along seaboards where high winds prevail, as on the sea-coasts of France and Spain, which face the Bay of Biscay. On the coasts of Devon, Cornwall, Norfolk, and Nairn, in Britain, sand-drifts may also be seen. The name D. is applied more distinctively, however, in geology to the glacial deposits belonging to the *Pleistocene*, *Recent*, or *Post-Pliocene* period of the Kainozoic rocks. These deposits are evidently the result of ice-action, and are also known under the names of 'boulder clay,' 'till,' &c. They occur in Britain as far S. as the Thames, over S. and Central Europe, and in N. America as far S. as the 39th parallel. They appear as sands, clays, and gravels, representing ice-carried débris, and, as in Wales, may occur at heights over 2000 feet above the sea-level. The fossils of the D., as might naturally be expected, are referable chiefly to living species of northern or Arctic kind; and many characteristic shells (such as *Pecten Islandicus*, *Fusus Islandicus*, *Scalaria Greenlandica*, &c.) occur in this formation. See also BOULDER CLAY.

Drill (*Papio leucophæus*), a species of Catarhine monkeys very nearly allied to the mandrill (*P. maimon*), and inhabiting the Guinea coast. The colour is not so brilliant as in the latter species, nor are the cheekbones so prominent. The upper parts are of a greener hue than those of the mandrill. The face and ears are black, and the soles of the feet are hairless. The D. is smaller than its neighbouring species, but in habits it closely resembles the mandrill.

Drill, a stout twilled linen fabric used for such articles of dress as require great strength and durability.

Drill, an instrument used for boring metal, stone, wood, glass, ivory, and other hard substances. Ordinary drills are made of very hard steel, and they are worked either in the lathe or the brace, or by the bow and string, &c. For rock-boring the diamond rock-D. is now generally adopted—an instrument with cutting edges made of the so-called black diamond (the boart or carbonado) of Brazil.

Drill, in agriculture, is applied to the rows in which any crop is sown, and also to the implement used for sowing seed in rows, as opposed to broadcast sowing.

Drill is the instruction of officers and men in the use of arms and in the evolutions of the field. Until within the last few years the system of military manœuvres was based on a system of D. which consisted in a series of changes of formation chiefly from line to column and from column to line. But recent warfare has proved that an attack in column is—since the vast improvements lately made in the range and precision of artillery and small arms —a thing no longer possible. Again, an attack in rigid line is, owing to the impossibility of facing modern fire in any close formation whatever, equally impossible. The column and line therefore having practically ceased to exist as formations in actual warfare, the whole aim and system of D. has been changed. Attack is now only possible in skirmishing order with supports, and reserves in rear. But the attack in skirmishing order presupposes a considerable degree of individual freedom of action; and under present conditions the aim of all D. is to develop, and at the same time to regulate, that freedom of action. Thus the scope of D. has within late years been greatly extended. The object of military training is no longer to ensure mechanical precision in the performance of unvarying evolutions, but to develop natural aptitude and judgment, so that in the advance in loose order every possible advantage offered by the ground may at once be perceived and seized by each individual combatant. The aptitude and judgment referred to, however, cannot be attained by the old system of D. In skirmishing, men are so widely scattered that their movements can no longer be controlled by word of command. A greater degree of responsibility must therefore be reposed in the non-commissioned officers and in the men themselves. But before these can be safely intrusted with this degree of responsibility and freedom of action, they must be regularly trained to act together in skirmishing order over a wide extent of country. This training it is one of the main objects of the Autumn Manœuvres to provide. For details of the new D., reference may be made to the recent regulations. See *Wellington Prize Essay*, by Lieut. F. Maurice (1872); Captain Brackenbury's *Tactics of the Three Arms; Changes of Tactics Consequent on the Improvement of Weapons and other Circumstances*, by Lieut.-Col. Middleton(1873); and *Field Exercises and Evolutions of Infantry, as Revised* (1877).

Drill'ing, military, without lawful authority, is punishable under statute.

Drim'ys. See WINTER'S BARK.

Drin'king U'sages. The ceremony of drinking healths, or of uttering a pious, friendly, or moral sentiment before taking wine, has doubtless had its origin in the religious observances of antiquity. In the Bible, we have frequent mention of a 'drink-offering' to the true God as well as to false gods, and among the Greeks and Romans a libation to the gods was a usual part of religious ceremony. Our own custom of health-drinking is probably of Teutonic origin; though we do not find the introduction of Christianity to have been followed by the suppression of drinking habits among our ancestors, or even by the diminution of them. 'The introduction of Christianity,' says Milner (*Archæologia*), 'among our ancestors did not at all contribute to the abolition of the practice of wassailing. On the contrary, it began to assume a kind of religious aspect, and the wassail-bowl itself, which in the great monasteries was placed on the abbot's table, at the upper end of the refectory or eating-hall, to be circulated among the community at discretion, received the honourable appellation of "Poculum Charitatis." This in our universities is called the "grace-cup."' The late Lord Cockburn in his *Memoirs* gives an amusing and interesting account of the fashion of drinking healths and toasts, as it prevailed in fashionable society in Scotland in the end of last century, and during the first quarter of the present century. Abroad there is a nominal drinking usage consisting in the uni-

versal expectation of servants, drivers, &c., with whom the traveller may come in contact, of a small gratuity, *pour boire* (Ger. *trinkgeld*). In the Highlands of Scotland it used to be the custom to speed the parting guest with what was called a *deoch-an-dorris* or stirrup-cup; for which the landlord of an inn made no charge. See Dunlop's *D. U. of Great Britain*, *Memoirs of Lord Cockburn*, and *Reminiscences of Changes of Social Life in Scotland* by the Very Rev. Dean Ramsay.

Drip'stone, a projecting moulding over the heads of doorways, windows, arches, niches, &c., which receives its name from the use it subserves of throwing off rain-water. From its position it is always ornamental, and in many situations in which there is no exposure to rain, this weather-moulding, as it is sometimes called, is retained simply from its value as an ornament. In Early English the D. was a small arched moulding, deeply hollowed on the under side, the ends of the arch usually resting on a corbel or boss of foliage; in the Decorated style it, like every other detail, was much enriched, being frequently crocketed and surmounted by a finial, so as practically to form a canopy; in the Perpendicular style it assumed a square form over the doorway.

Driver, or **Spanker**, in ships, the name of a large sail sometimes set upon a gaff on the mizzen-mast.

Driving, Law Regarding. Under statute, no stage-coach is allowed to carry more passengers than it is constructed for. A space of 16 inches must be allowed to each passenger. Penalties are enacted against intoxication or negligence on the part of any one employed about the coach, and against careless or furious driving. See CARRIERS.

Drogh'eda (Irish Gael. *Droichead-Atha*, 'the bridge of the ford'), a seaport of Ireland, forming a county by itself, enclosed within the counties of Louth and Meath, province of Leinster, 4 miles above the mouth of the Boyne, and 31 miles N. of Dublin by railway. There is a railway viaduct 95 feet high across the Boyne, and a lattice railway bridge across the Royal Canal. Of recent structures the chief are the waterworks, which deliver an ample supply of good water, the townhall, with assembly-room to accommodate 700 persons, the cotton-factory, and flax-mills, in which the bulk of the working population are employed. There are tanneries, breweries, a number of iron, salt, and soap works, and a shipbuilding yard. At the entrance to the harbour are three lighthouses. Grain, cattle, and provisions are exported, and tea, brandy, and timber are imported. In 1873, 810 vessels of 144,335 tons entered, and 816 vessels of 144,135 tons cleared the port. Pop. of parliamentary borough in 1871, 15,246. An important synod, summoned by the Pope's Legate, and the effect of which was greatly to extend papal authority and influence in Ireland, was held here in 1152. D., as a frontier town of the pale, was an important military station between the 14th and 17th centuries. Here Irish Parliaments were frequently held, and the right to coin money was exercised. The town was captured and its garrison destroyed by Cromwell in 1649, and in 1690 it surrendered to the royal forces after the battle of the Boyne. Of the fortifications scarce a remnant exists; but there are a number of interesting remains of old religious houses, as the Dominican and Franciscan friaries, and the Hospital of St Mary.

Droh'obicz ('the woody place'), a town of Austrian Galicia, on the Tisminica, a tributary of the Dniester, about 45 miles S.W. of Lemberg. It contains a military training school, and has important saltworks. Pop. (1869) 16,880 inhabitants, mostly Jews.

Droit d'Aubaine (Lat. *alibi nati*), a usage in France, abolished in 1819, by which the movable estate of an alien became the property of the sovereign, any will made notwithstanding. Exemptions were made in favour of the Scotch, Savoyards, Swiss, and Portuguese.

Droits of the Admiralty. See ADMIRALTY DROITS.

Droit'wich (Lat. *Salinæ*), a parliamentary and municipal borough, Worcestershire, in the valley of the Salwarp, and a station of the Bristol and Birmingham and W. Midland Railway, 7 miles N.E. of the city of Worcester. It is connected with the Severn by a canal. The manufacture and export of salt, got from the brine-wells by evaporation, constitute the principal trade of the town. The name is derived from *wich* or *wirk* (the Scandinavian *vig*, 'bay,' as salt was obtained by the evaporation of sea-water in shallow bays), and *droit*, 'tax.' It thus signifies the salt-springs where the tax was paid. Pop. (1871) municipal borough, 3504; parliamentary borough, 9510. Some Roman remains have been found here.

Dromathe'rium, an extinct genus of Marsupial (q. v.) mammalia, the remains of which (consisting of the lower jaw) are exceedingly interesting as forming one of the earliest traces of mammalian existence on our globe. The D. remains occur in the Triassic rocks of N. America. D. was a mammal of small size, and appears to have been very nearly related to the little *Myrmecobius fasciatus*, or banded ant-eater of New South Wales. *D. sylvestre* is the name which has been given to the D. remains. The lower jaw contains 'ten small molars in a continuous series, one canine, and three conical incisors—the latter being divided by short intervals' (Owen).

Drôme, a department in the S.E. of France, bounded on the W. by the Rhone, which separates it from the department of Ardèche, and surrounded on the N.E., E., and S. by the departments of Isère, Hautes-Alpes, Basses-Alpes, and Vaucluse. In the E. the country is covered with mountains (highest peak 8068 feet), giving rise to westward-flowing streams, the chief of which is the Drome (length 103 miles). In the S. there are ranges of vine-clad hills, and fertile plains with numerous mulberry plantations, supporting an extensive local silk husbandry. Area, 2519 sq. miles; pop. (1872) 320,417. One-half of the area is cultivable, and vineyards and forests occupy large tracts. The raw silk produced amounts to 585,000 lbs. annually, worth ten million francs. The four vineyards of Die, Douzere, Saillans, and Mercurol alone produce thirty-three million gallons of highly-esteemed wines named *vins du Rhone* annually; but the finest vineyard is that of L'Ermitage, which produces the red wines of *Meal* and *Grieffieux* and the white wines of *Baume*, *Muret*, and *Reaucoule*. Cloth and serge are extensively manufactured; there are 130 silk factories, and numerous potteries, tanneries, &c. Silk, timber, cattle, wine, honey, wax, and olives are exported. The department is traversed from N. to S. along the banks of the Rhone by the Lyon and Avignon Railway. Valence is the chief town.

Drom'edary (*Camelus dromedarius*), a species of *Camelidæ* or Camels (q. v.), also known under the names African and Arabian camel, and distinguished by its possessing a single hump only. This species in other respects resembles its neighbour the Bactrian camel (*C. Bactrianus*), which has two humps, the two species being said to breed together, whilst their hybrid progeny is also said sometimes to be fertile. The D. is by far the most valuable of the two species in so far as its usefulness to man is concerned. It is a much more elegant animal than the Bactrian camel, and is altogether swifter and more agile. The D. is much used for riding, the *heiries* or 'swift camels' being highly bred and trained animals of this species. The average speed of the D. is from 8 to 10 miles per hour, but their power of passing over long tracts depends rather upon their endurance than actual speed. See also CAMEL.

Dromore' (Irish Gael. *Druim Mor*, 'great ridge'), a cathedral town in the county of Down, on the Lagan, 17 miles S.W. of Belfast by railway. Pop. (1871) 2408, principally employed in the preparation of flax, and in linen manufactures and muslin embroidery. The see of D., which also gives name to a Roman Catholic bishopric, is said to have been founded by St Colman (6th c.), and was incorporated (Act 3 and 4 Will. IV. c. 37) in the diocese of Down and Connor. Jeremy Taylor was Bishop of D.

Dron'theim, the German form of the Norwegian Trondhjem (q. v.).

Drone-Fly (*Eristalis tenax*), a genus of *Diptera* (q. v.), or Flies belonging to the family *Tabanidæ*, and noted for its close resemblance to the hive-bee. The larvæ are known as 'rat-tailed maggots,' and are found in mud.

Drop'sy (Gr. *hydrops*, from *hydōr*, 'water') is an accumulation of water or serum into one or more of the serous cavities of the body, or into the meshes of the areolar tissue. It may arise from various causes, as inflammation, or effusion into the

cavity of the chest after pleurisy; or it may be due to disease of the liver, heart, kidneys, or other internal organs. The treatment varies with the cause; diuretics, purgatives, diaphoretics, and tonics are all beneficial.

Drop'wort. See SPIRÆA and WATER DROPWORT.

Drosera'ceæ, the Sundew order, a natural order of Dicotyledonous plants, the leaves of which are often covered with glandular hairy-looking prolongations of the substance. There are about ninety species and seven genera known, most of which are inhabitants of bogs and marshy places. Acrid and slightly acid properties are the characteristics of the order. The exact relatives of the order are doubtful, but probably Hooker's view, that it should be placed near the *Saxifragaceæ*, is correct. It is found in Europe, India, China, Cape of Good Hope, Madagascar, N. and S. America, and Australia.

Dros'te-Hüls'hoff, Annette Elizabeth, Freiin von, was born at the family seat of Hülshoff, near Münster, January 12, 1798. Her constitution was delicate, and her life one of almost unbroken retirement. In her later years she began to embody the deepest and tenderest experiences of the female mind in a series of lyrics and poetic tales. Her expression is at times misty, but this is far more than atoned for by her originality of thought and truthful rendering of subjects at once poetical and elevating. She is perhaps the only real poetess Germany ever produced, and certainly takes a foremost place among modern writers. She died May 24, 1848. See her *Gedichte* (Stutt. 1844, 2d ed. 1861), *Das geistliche Jahr nebst einem Anhang religiöser Gedichte* (Stutt. 1853, 2d ed. 1857), and *Letzte Gaben* (Hanov. 1860, 2d ed. 1870). See Schücking's *A. von D.* (2d ed. 1871).

Drou'et, Jean Baptiste, Comte d'Erlon, an eminent French marshal, born July 29, 1765, at Rheims, entered a regiment of volunteers in 1792, and distinguished himself in the campaigns both on the German frontier and in the Peninsula. He was faithful to the fortunes of his master, Napoleon, and was commander of the first *corps d'armée* at Waterloo. In 1832, after the Revolution of July, he received the command of the army of Vendée, and (1834-35) held the post of Governor-general of Algeria. D., who was made a marshal in 1843, died January 25, 1844.

Drou'yn de Lhuys, Édouard, a French statesman, was born in Paris, November 19, 1805. He carried off all the first prizes at the Collége Louis-le-Grand, was initiated into politics as *chargé d'affaires* at the Hague, and afterwards held a similar post in Spain. In his political career D. distinguished himself mainly by his opposition to M. Guizot, whom he helped to overthrow in February 1848. When Louis Napoleon was President of the French Republic, D. was Minister of Foreign Affairs, and held the same portfolio after the *coup d'état*. In consequence of the results of the Conferences of Vienna of 1855 in regard to the Crimean war, he resigned, to be recalled, however, in 1863. He resigned again in 1866, but received many imperial dignities, including the Grand Cross of the Legion of Honour. After the fall of the Empire at Sedan, D. withdrew to St Heliers, Jersey.

Dro'vers ('drivers,' *i.e.*, of cattle) are those who buy cattle in one market to sell in another. They are traders subject to the bankrupt laws. The name is also commonly applied to those whose business is to drive cattle to or from the markets. In the metropolis they are classified as *country*, *butcher*, and *London* D. They are required, under a penalty of 40s., to wear a ticket, to take a yearly licence, and to use no stick which has not been marked by the clerk of the market.

Drowning, death from submersion in water, was commonly practised in the middle ages as a form of capital punishment, and as such was only abolished in Scotland in 1685 and in Austria in 1776. Much attention has been recently devoted to the subject of the recovery of persons after apparent death from D., and the following are now established rules:—(1) Place the body in a horizontal position, and gently move it from a prone to a half-prone position, or retract the arms with slight force; (2) rub the limbs upwards with dry cloths; and (3) restore Respiration (q. v.) either by direct inflation of the lungs by the breath or by bellows. See ASPHYXIA.

Droyls'den, a growing suburb of Manchester, four miles E. of that city, and a station on the Lancashire and Yorkshire Railway. It has several good churches, a literary institute, spinning-mills, dyeworks, printfields, &c. Pop. (1871) 6768.

Droy'sen, Johann Gustaf, a German historian, born at Treptow, in Pommern, July 6, 1808; studied at Stettin and Berlin; became professor in Berlin in 1835, and Professor of History at Kiel in 1840; was elected to the National Assembly in 1848; appointed professor in Jena in 1851, and again in Berlin, 1859. His writings include *Geschichte Alexanders des Grossen* (Berlin, 1833); *Geschichte des Hellenismus* (Hamb. 1836-43); *Vorlesungen über die Geschichte der Freiheitskriege* (Kiel, 1846); *Leben des Feldmarschalls Grafen York von Wartenburg* (Berlin, 1851, 2d ed. 1854); *Ueber Preussen und das System der Grossmächte*, *Actenmässige Geschichte der Dänischen Politik* (Hamb. 1850). Later works are his *Geschichte der Preuss. Politik* (10 vols. 1855-70); *Urkunden und Actenstücke zur Geschichte des Grossen Kurfürsten* (1864-65); and translations of Æschylus (3d ed. 1868) and Aristophanes (2d ed. 1869).

Drugg'et, a coarse woollen fabric, either woven or felted, chiefly employed as a crumbcloth for laying over carpets, or as an inferior kind of carpeting.

Drugs are medicinal substances used by the physician to cure disease and alleviate human suffering. They are derived from the animal, mineral, and vegetable kingdoms.

Dru'id, the name for priest among the ancient Celtic nations. Zeuss (*Gramm. Celt.*, vol. i. p. 8) derives it from *drui*, an old Celtic term for oak-tree. The Druids taught their pupils by means of verses, which were committed to memory, but never allowed to be written; consequently we have no record by themselves either of their doctrines or their ritual, and derive such scanty knowledge as we have of them from writers who were strangers to their language and hostile to their tenets. Cæsar (*Bell. Gall.* vi. 13) is our principal authority, although many other authors, Greek and Latin, write concerning them.

The Druidical system was skilfully and elaborately organised. Like the Magian in Persia, it drew to itself almost the entire power of the state. Its priests naturally regulated everything pertaining to divine worship. They had also the complete control of the education of the people, and further secured to themselves the exclusive interpretation both of the civil and the criminal law. If any one, high or low, opposed their decrees, 'they interdicted him from the sacrifices,' a sentence with consequences so ruinous that no one could withstand them. Besides possessing these extensive powers, the Druids were exempt from military service and taxation; consequently admission to their ranks was an object of ambition to the highest in the land, and the rivalry for the office of supreme head, or arch-D., often led to bloody warfare. The Druids held the immortality and the transmigration of souls, taught geography and astronomy, discussed the nature of things, and the powers of the immortal gods. The preparatory training of candidates sometimes occupied twenty years, and both Strabo and Lucan speak of their possessing a profound spiritual discipline. In Gaul they worshipped the Greek and Roman deities, principally Mercury, but also Mars, Apollo, Jupiter, and Minerva, to all of whom they offered human victims in sacrifice. Probably the Gauls learned the above names from their neighbours, the Italians; but in Britain, whence the Gauls derived their Druidical knowledge, the sun, under the name of *Bel*, appears to have been the principal object of worship. In the S. as well as in the N. of Scotland, the beginning of summer is still known as *Beltein* (q. v.), and the beginning of winter is in all the Gaelic-speaking districts known by a word signifying 'the fire of peace.' At both these terms the fire on every hearth throughout the land was extinguished, and every householder had to go to the D. to obtain sacred fire directly from him. None dared lend it to his neighbour. We have the memory of this old tyranny still preserved in some Highland districts, where people will on no account allow any fire to be taken out of their houses at either of the above seasons, and we have the kindling of fires upon hill-tops both in the islands and on the mainland (where those who observe it can give no account of the practice, except that it is a habit derived from their ancestors), evidently a remnant of the old fire-worship.

The oak-grove is said to have been the favourite place of Druidical worship, and peculiar sacredness was attached to the well-known mistletoe, a parasite of the oak. Many of their

temples have been well called 'groves of stone,' where several stone pillars are ranged in concentric circles, with a large slab sometimes resting on the tops of two of these pillars. Others of these 'Druidical stones,' or 'circles,' as they are popularly termed, are arranged with less regularity; but at Carnac in Brittany, Avesbury and Stonehenge in England, Stennis in Orkney, and Callernish in Lewis, as well as in many other places, they present rude but very remarkable and imposing proofs of mechanical power and skill. Some modern antiquaries maintain that these great pillars are only monuments to the dead; but there seems no valid reason to question the general belief that, like so many of our churches, they formed both temple and tomb, and this belief is confirmed by the fact that, in very many parishes in Scotland, the Christian church is known by the name applied to the old Druidical circle, *clachan* = the 'stones.'

It is also said that Druidism was never known in Scotland. The ancient language of the country proves this opinion to be erroneous. Many places are named as the abodes of Druids. In the Gaelic Bible the magicians of Egypt are called Druids. In common discourse, a person who by persuasion acquires complete control of another is said to exercise Druidism over him, and the meteors known as shooting stars are called 'the death of a D.,' implying the belief that their souls ascended in fiery chariots. The Druidical worship was forbidden by the Emperor Claudius as early as 55 A.D. It is said that a few years later thousands of the priests were massacred in Mona, or Anglesey, by the Roman general Suetonius; but they retained power until the Celtic nations were converted to Christianity.

Drum, a well-known musical instrument of percussion. The *kettle-D.*, of which every orchestra has at least two, is the most important form of the instrument. It is made of copper, and by screws which alter the tension upon the D.-head can be tuned to any musical note within a certain limited range. The ordinary *side-D.* of military bands, and the bass or 'big' D., which is also used in the orchestra, have a sound of some sonorousness, but not of definite pitch, and are useful chiefly in marking rhythm.

Drum was the name of a somewhat uproarious evening assembly of the fashionable about the middle of the 18th c., chiefly convened for the purpose of card-playing, and so called, according to Smollett, 'from the noise and emptiness of the entertainment.' A large party of the kind was styled a 'drum-major.'

Drum, in machinery, a short hollow cylinder of iron or wood, revolving on a shaft or axis, useful for driving all kinds of mill-gearing and machinery by means of an endless belt or band. The beating apparatus in the threshing-machine is termed the D.

Drum of the Ear. Properly speaking this is the middle ear, or tympanum, although, in ordinary language, the term is frequently used to denote the membrane between the external ear and the middle ear—*membrana tympani*. See EAR.

Drum-Fish, a general name given to those fishes which, like the Maigres (q. v.), make a kind of grunting noise, but applied more specially to the *Pogonias chromis* or bearded D.-F. of the N. American coasts, which produces a noise closely resembling the beating of a drum. In this Teleostean fish, which is included in the family *Sciænidæ*, the chin is provided with many small *barbules* or filaments. The first dorsal fin is provided with ten spines, whilst the anal fin is two-spined.

Drum-Major, an army officer, equal in rank to a sergeant of the line, who superintends all 'time bugling,' as the calls for the men to dress, for falling in, reveille, tattoo, &c., trains the drummers and fifers, and is supposed to regulate the pace on the line of march In the days of 'flogging' it was the duty of the D.-M. to train the drummers to wield the 'cat.'

Drumm'er, a person in every regiment, not to be confounded with any of the drummers in the regimental band of music. He conveys instructions by various beats of the drum, drums out any soldier discharged in disgrace, and used to inflict the lash when the soldier was flogged. See BEAT OF DRUM.

Drummer (*Blatta gigantea*), a large species of Cockroach (q. v.) common in the West Indies, and named from the noise it makes during the night, chiefly by knocking its head against wood.

Drumm'ond, Captain Thomas Henry, a distinguished civil engineer and inventor, was born at Edinburgh, 1797, obtained a cadetship at Woolwich, and was engaged by Colonel Colby in the British trigonometrical survey of 1820. While engaged in this survey he produced the famous light known by his name (see DRUMMOND LIGHT), and also invented a Heliostat (q. v.), an instrument for the vivid and distant reflection of the sun's rays. He was appointed head of a commission to determine the boundaries of boroughs, according to the provisions of the Reform Bill of 1831. In 1835 he was raised to the post of Under-Secretary for Ireland, and before long gained the confidence of all classes by his unflagging energy and intelligence. As head of a commission he made a valuable report on a railway system for Ireland in 1836. He died, keenly regretted by his own friends and by the friends of Ireland, April 15, 1840. See M'Lennan's *Memoir of Thomas H. D.* (Edinb. 1867).

Drummond, William, the chief Scottish poet of the 17th c., was born of an old and honourable family, at Hawthornden, December 13, 1585. D. was educated at the High School and University of Edinburgh, graduating in 1605, after which he left for the Continent to study civil law. From 1606 to 1608 he resided in France, and in 1609 returned to Scotland. Next year his father died, when D. found himself master of the family estate and of ample means, and abandoned legal studies for the life of a student in his retreat at Hawthornden. His first published work, an elegy on the death of Prince Henry, entitled *Teares on the Death of Mœliades*, appeared in 1613. In 1616 he published *Poems, Amorous, Funerall, Divine, Pastorall, in Sonnets, Songs, Sextains, Madrigals*, the prevailing tone of which is sad, for his betrothed had died in the previous year. His next work, *Forth Feasting, a Panegyric to the King's Most Excellent Majesty*, celebrated King James's visit to Scotland in 1617. In 1618 Ben Jonson spent two or three weeks at Hawthornden, an event recorded in D.'s *Notes of Ben Jonson's Conversations at Hawthornden*, discovered by Mr Laing in the Advocates' Library, Edinburgh. In 1623 appeared his last poetic work, the *Flowers of Sion*, religious poems, to which was appended the *Cypresse Grove*, a brief prose essay on death. Two years later, D. revisited France, and probably the Low Countries, Germany, and Italy. He returned in 1630, and in 1632 married Elizabeth Logan, a member of the Restalrig family. In 1633 D. began his *History of Scotland under the Five Jameses*, and, during his closing years was a vigorous political pamphleteer. He was an ardent royalist; and the execution of Charles I. so affected him, that it is said to have hastened his death, December 4, 1649.

D.'s verse is pensive and thoughtful, and, in general, coloured by a sensuousness derived from Spenser. The vulgar *Polemo-Middinia* (Oxford, 1691) would be a violent contrast to his usual style were its authenticity less problematical. D.'s sonnets, which gave him the title of 'The Scottish Petrarch,' show him perhaps to greatest advantage, being more natural than his longer pieces. His works contain a decided pastoral element, and his Italian studies imparted to his poetry a peculiar melody. D. stands almost alone in Scottish poetry between Gavin Douglas and Allan Ramsay.

D.'s collected works were edited by Bishop Sage and Thomas Ruddiman (Edinb. 1711); by Lord Dundrennan and Mr Irving for the Maitland Club in 1832; and by Cunningham (1833) and Turnbull (1857). See Masson's *D. of Hawthornden* (Macmillan, 1873).

Drummond Island, in the N.W. extremity of Lake Huron, is 20 miles long and 10 broad, and belongs to Michigan. There is a settlement here which carries on some trade.

Drummond Light, or **Limelight**, is produced by the play of an oxyhydrogen flame upon a cylinder or ball of lime, which, becoming vividly incandescent, evolves an intensely brilliant and pure white light. The oxygen and hydrogen gases are stored separately, and are only allowed to mingle near the nozzle of the blowpipe, because of the highly explosive character of the mixture. Although lime is very refractory under the blowpipe, the prolonged action of the flame upon one point causes it to crumble away, thereby destroying the steadiness of the light, but this disadvantage is in a manner met by turning the cylinder of lime on its axis by clockwork. Experiments were made with the limelight as early as 1820, but Lieutenant Drummond, R.E., in 1826, was the first to apply it practically. While conducting a

trigonometrical survey of Ireland and Scotland he used the light, placing it in the focus of a parabolic reflector, for signalling between distant and lofty eminences. On one occasion he made a successful observation by means of it between stations—Ben Lomond in Stirling and Knock Layd in Antrim—95 miles apart. In 1861, the South Foreland lighthouse was fitted with the lime-light apparatus. As the light results from incandescence of the lime, there is no combustion of atmospheric air and no formation of carbonic acid gas, but in regard to the extension of the limelight to ordinary illumination, these sanitary advantages are neutralised by the inconvenience in preparing the gases and the absence of continuity of the light. It is chiefly employed to enhance scenic effects and for magic-lantern exhibitions.

Drunk'enness. See INTOXICATION.

Drunkenness. Persons completely drunk, being incapable of legal consent (see CONSENT and CONTRACT), cannot enter into a contract or obligation; but a minor degree of intoxication may be insufficient to reduce a contract, unless fraud is proved against the other party to it. D. does not excuse crime, though in minor cases it may be held to palliate it. To be drunk privately is not an offence against law; but to be drunk in public is an offence punishable by fine.

Drurajapatam', or **Durguranzepatam'**, a seaport of British India, province of Madras, district of Mellore, 64 miles S. of Nellore, and 60 N. of Madras. It lies on an inlet of Blackwood Harbour, the safest haven on the Coromandel coast, and near the entrance to Pulicat Lake, which has been artificially extended to Madras city. Pop. 8000.

Dru'ry, Dru, a naturalist, born in London, February 4, 1725, was a goldsmith in the Strand for several years, but eventually abandoned himself to the study of natural history. His chief work was his *Illustrations of Exotic Entomology* (2 vols. Lond. 1873-82), with its excellent drawings. D. died January 15, 1804.

Dru'ses, a people inhabiting the less fertile parts of the mountains of Lebanon and Anti-Lebanon. They have arisen from a mingling of Kurds, Arabs, and the Mardi, a tribe from the Caspian, and have derived their name from Drusi, probably a tailor—modern *trozee*—who lived in the 11th c., and preached the divinity of Hakim, a Calif still adored as a god by the D., and expected to come as a messiah through Central Asia from China. They also worship a golden calf, but the rites of their religion, which seems a mixture of Christian, Sadducee, and Mohammedan doctrines, are concealed. They at present number about 80,000, and are divided into two classes, the Okals and the Jakals. The Okals, or the learned section, are initiated in the mysteries of the Druse creed, profess rigid morality, and form a senate for administering affairs. The Jakals, or unlearned, can rise to the class of Okals through a long and severe novitiate. Many of the Okals retire to places of worship on lofty summits, called Holowas, several of which are dedicated to Job and other prophets. The D. are famed for their fine breed of horses, and for their skill in the use of the *djerced* or javelin. A curious belief that they are mystically connected with the Scotch, and possess the same faith, has spread among them. The D. attained their greatest prosperity in the first half of the 17th c., under the Emir Fakardin, but since his death in 1631 have been nominally subject to the Turks. With the Maronites (q. v.), or Christian tribes of the Lower Lebanon, they have had long and bitter feuds, and in 1860 horrible massacres were perpetrated by both parties. The D. are a brave and intelligent race, and do not practise polygamy. They cultivate vines and corn on the terraces which they have raised on the sides of the mountains. Their chief manufactures are shawls, mantles, &c., of silk; and for local wants, wine, arrack, yarn, and soap. Their chief town is Dair-el-Kamar (q. v.).

Dru'sus, a distinguished Roman family, of which the following were the most remarkable members:—1. **M. Livius**, who became consul B.C. 112, and who throughout his official career was the successful representative of the senatorial party, and opponent of C. Gracchus.—2. **M. Livius**, son of the former, was early a strong partisan of the senate, but subsequently displayed great skill in manipulating the mob, whom he bought over by conciliatory laws and lavish gifts. The social irritation thus caused was inflamed by the favour shown to the Latins and other foreigners, and the career of D. closed in an intricate network of conspiracy and intrigue. Arrogant in disposition, he died unregretted by all, B.C. 91.—3. **Nero Claudius**, commonly called D. Senior, stepson of Augustus, brother of Tiberius, and father of Germanicus, was born B.C. 38. He acquired the highest distinction both in administration and in war. He defeated the Rhætians (B.C. 15), subdued tumults among the Gauls (B.C. 12), and in pursuit of their allies advanced to the German Ocean. Thereafter, during a series of brilliant campaigns, he subjugated in succession the leading tribes of the Germans, and, at the expense of fearful bloodshed, established over them the supremacy of Rome. He received after death the agnomen *Germanicus*. He died B.C. 8.

Dry'ads (from Gr. *drus*, 'an oak'), inferior divinities in the Greek mythology, who came into existence with particular trees and died with them. See NYMPHS.

Dry'den, John, an English poet, was born at Aldwincle, Northamptonshire, August 9, 1631. He belonged to a good family of staunch Puritan principles, was educated under Busby at Westminster, and took the degree of B.A. at Cambridge in 1653. Having inherited property worth £40 a year on his father's death in 1654, he studied at Cambridge until 1657, when he entered on a literary career in London. In 1658 he produced *Heroic Stanzas on the Death of Oliver Cromwell*, and at the Restoration, changing, as Johnson says, with the nation, offered a tribute to Charles II. in his *Astræa Redux*. In 1663 he married Lady Elizabeth Howard—a union which proved unhappy. The *Wild Gallant*, his first play, and the *Rival Ladies*, a tragi-comedy, were acted in 1663, and his rhymed tragedy, the *Indian Queen*, was very successful in the following year. The Great Plague of 1665 closing the theatres, D. for a while gave up play-writing to celebrate the Dutch war and Great Fire of 1666 in his *Annus Mirabilis*. Between 1668 and 1670 he produced several plays, which won great popularity, and about this time he engaged to write three plays a year for the King's Theatre, in return for an annual share in the profits equal to £300 or £400. In 1668 he advocated rhyming tragedies in his *Essay on Dramatic Poetry*, and was chosen laureate in 1670; but in 1671 the town was set a-laughing by the *Rehearsal*, a farce written by Buckingham and Butler, ridiculing D.'s tragedies, and caricaturing him under the name of Bayes. D. continued to compose plays with less success than formerly up to 1681, when he produced *Absolom and Achitophel*, a satire—the best which had as yet been written in English—denouncing Shaftesbury's and Monmouth's schemes to oust the Duke of York from the succession. He attacked Shaftesbury again in the *Medal*; crushed Shadwell, a Whig poetaster, in *MacFlecknoe*; and defended the Church of England in *Religio Laici* (1683). After the death of Charles II., lamented in D.'s *Threnodia Augustalis*, he abandoned the Anglican for the Romish faith, a change of which the sincerity is denied by Macaulay, but maintained by Bell, D.'s recent editor. He defended his new religion in the *Hind and the Panther* (1687), an elaborate allegory, in which the different Churches appear as beasts. The Revolution removed him from the laureateship, and ended his controversial career. In his old age he had to write for a livelihood. He translated Juvenal, Persius, and Virgil (1696); wrote the *Ode on St Cecilia's Day*, a masterpiece of changing rhythmical effects; and in 1700 published his *Fables*, adaptations from Boccaccio and Chaucer, the most graceful and fanciful of all his writings. During his closing years he was regarded as a literary dictator, holding his court at Wills' Coffeehouse among the young wits and noblemen. He died on the 1st May 1700, and was buried in Westminster Abbey.

D. does not belong to the highest class of poets, for he is wanting in imagination, passion, and tenderness. His cardinal merits are clearness, keenness, and vigour. As a playwright, seeking to combine the incompatible characteristics of the Elizabethan and the French drama, he produced hybrid tragedies and indecent comedies; strained after sublimity, and floundered into rant; offered obscenity instead of humour, and stilted rhetoric instead of eloquence. As a satirist he is unequalled among Englishmen. No other is so comprehensive, fervid, and penetrative; none unites such majesty of verse with such trenchancy of epithet; none shows such mastery of metrical logic. But he was not a satirist of the noblest type. He did not attack the wickedness of his age. His translations are somewhat unfaithful;

his bluff homeliness occasionally outrages the Virgilian art, and his tales from Boccaccio and Chaucer want the subtle charm of the original. His prose is at once dignified, incisive, and idiomatic. He was a great literary reformer as well as a great satirist; he purged English verse of conceits, and instead of a crabbed and flimsy, left a flexible, natural, and robust poetry. The best editions of D. are Bell's, in three vols., with an admirable biography; and the *Globe*, edited by W. Christie, which has the best text. Critical estimates of D. may be found in Masson's and Lowell's *Essays*, and in Taine's *English Literature*. See also Ward's *History of English Dramatic Literature* (1875).

Dry'ing Machines. A variety of contrivances are in operation, chiefly in bleaching, calico-printing, and dyeworks, for effecting the rapid drying of textile substances in the various processes connected with these arts. The apparatus chiefly relied on in bleaching and calico-printing is a series of tinned-iron or copper cylinders, mounted in a frame and heated by steam, around which the material passes, and is carried forward by their revolution. A number of substances, however, such as thread and yarn in the hank, cannot be treated by such an arrangement, and for these a machine, called the hydro-extractor, is employed. It consists essentially of a cylindrical metallic drum, mounted on a pivot, so arranged that it can be turned with great velocity, and the drying is effected by the centrifugal force thus communicated to the material placed within the drum and the particles of water it contains. Drying is also effected in 'stoves' or apartments heated to a high temperature either by steam-pipes or flues.

Drying Oils. See OILS.

Dry'ophis, a genus of *Ophidia*, or Snakes, forming the type of a special family of Colubrine (q. v.) serpents, and represented by such forms as the *D. acuminata* or golden tree-snake of Mexico. In these snakes, which are also represented in the Old World, the body is long and slender, and the head narrow; whilst the upper jaw is longer than the lower jaw, and the snout pointed.

Dry-Plate Processes, photographic processes by which dry sensitive plates are prepared and preserved for subsequent use, thus obviating the inconvenience of a field-operator carrying his various chemicals and a tent or dark room in which to work. In the wet collodion process the plate must be manipulated while the film is moist, because when dry it becomes insensitive and impervious to the developing liquid; but in practising the dry process the sensitive plate may be prepared at home, exposed in the camera some days or weeks afterwards, and developed at home. Dry plates are not quite so sensitive as wet plates, and consequently require longer exposure. Various dry processes are practised, and for practical details of two of the principal—the collodio-albumen process, and the dry collodion process of Dr R. H. Morris—Hardwick's *Photographic Chemistry* may be consulted. See also Thomson's *History and Handbook of Photography*, translated from the French of G. Tissandier (Lond. 1876).

Dry-Point, a finely-pointed needle used to cut fine lines in engraving, and so called because in using it the tool alone is employed—no acid being used. The lines so produced are as durable as they are delicate.

Dry-Rot, a disease of wood caused by the attacks of various species of fungi, the root-like mycelium of which spreads through the substance, destroying all before it. The best remedy consists in careful selection of wood, 'perfect ventilation, and patient seasoning, added to the employment of such kinds of wood for particular purposes as may be most suitable to the situation they are intended to occupy.' Saturating the timber with creosote, which coagulates the albumen, and makes it enter into combinations unfit for vegetation, is one of the favourite, modern remedies. D.-R. may, however, also be caused by a slow chemical combustion, quite independent of fungi. Well-seasoned timber will last long without being attacked by D.-R. In England there is found wood in many buildings a thousand years old; and wood in a perfect state of preservation was taken from behind the frieze of the Parthenon, where it had been placed 2000 years ago. Charred blocks of wood have been found during Layard's excavations in Nineveh. See also KYANISING.

Dry Stove, in gardening, is a house in which a high temperature, combined with dry air, is maintained, for the purpose of growing cacti and other fleshy plants which belong to hot, arid climates.

Du'al. The term applied in grammar to a form which exists in some languages in nouns, pronouns, and verbs, when only two persons or things are spoken of. For example, in Greek, *anthropos* is 'a man,' *anthrōpō*, 'two men,' *anthrōpoi*, 'men.' Sanskrit, Arabic, Ancient Greek, and Hebrew all have a D. number, the latter in nouns only. Gothic and Old English also have it to some extent, the former in verbs, the latter in the pronouns of the 1st and 2d person—*wit*, 'we two,' *git*, 'ye two.' The words *duo* and *ambo* scarcely warrant us in assuming that such a form ever existed in Latin. The fact that it is only in ancient languages that we find a D. form goes to prove that it is not a refinement of speech—not *an abridged form of the plural which usage afterwards limited to the number two*, as Buttmann and others have held, but that it is one of the earliest births of language; that it indicates a lack of the power of abstraction, and that it gradually disappears on the development of that power.

Du'alism, in religion, is the deification of two principles, absolute good and the greatest evil. As an absolute good and an absolute evil cannot coexist, it has often been supposed that the evil principle was originally good, but lost his first estate. But as mutation would imply inferiority and dependence, it has again been supposed that good and evil are only manifestations of one absolute being, and that evil, being only negative, will ultimately disappear. D. was a religious faith in Persia long before Zoroaster. Plutarch and Marcion were both Dualists. The Manichæism that disturbed early Christianity was a form of D. In philosophy, the term is applied to the view that there are in the known universe at least two orders of phenomena mutually independent, the laws of the one not admitting of explanation by those of the other. In metaphysics D. means the coexistence of substances of which the essences exclude each other. The metaphysical alternative is the existence of a solitary substance, of which everything else is a mode, or modification of an attribute; the scientific alternative is one aggregate of phenomena with a twofold aspect.

Dubarr'y. See BARRY, COMTESSE DE.

Dubit'za, or **Dubicza** (Slav. 'the place of oak-trees'), a frontier fortress of Turkey, Bosnia, on the right bank of the Unna, six miles above its confluence with the Save. It was frequently besieged by the Austrians, was stormed by them in 1685 and 1687, and again, after a heroic defence by the Turks, in 1788. Pop. about 6000. On the opposite side of the Unna is the strong fortress of Austrian D. with 3000 inhabitants.

Dub'lin (Irish Gael. *Dubh-linn*, 'black pool,' of which the *Eblana* of Ptolemy is probably a corruption), capital of Ireland, and one of the finest cities in the empire, is situated on the mouth of the Liffey, at the head of Dublin Bay. It is divided into two nearly equal parts by the Liffey, which runs from W. to E., and affords, with the great thoroughfare running from N. to S., from Rutland Square by Sackville Street, Carlisle Bridge, Westmoreland Street, and Grafton Street to St Stephen's Green, a key to the topography of the city. The north-eastern is the most aristocratic quarter, while the business portions are the centre and N.W., where are chiefly the residences of the middle classes. D. is surrounded by the Circular Road, nearly 9 miles long, forming a favourite drive and promenade. Offshoots of the Wicklow Mountains occur to the southward of D., and the fine mountain scenery constitutes a picturesque background to many of the street views on the S. side. The river is spanned by nine bridges, the last or most easterly of which is Carlisle Bridge, which connects the two great thoroughfares Sackville and Westmoreland Streets, and is the point from which the finest views of the public buildings and the river are obtained. Of these latter, the chief are (on the S. side of the river) the Bank of Ireland, formerly the Irish Parliament House, of which the old House of Lords remains substantially unaltered, while the House of Commons has been converted into a cash office: it is a large classical edifice, with porticoes and colonnades, standing on the N. side of College Green; Trinity College (see DUBLIN UNIVERSITY), on the E. side of College Green, consisting of several quadrangles occupying an area of about 40 acres: the chief façade is a handsome elevation in Portland stone; in the

Corinthian style of architecture; the Library of the college, and the New Museum; the Castle, consisting of a series of buildings surrounding two courts, stands on high ground at the W. end of Daine Street, but is neither remarkable for its architectural merits nor imposing in its proportions; the Cathedral of St Patrick, with the memorial stones of Swift (once Dean here) and of 'Stella;' the General Post-Office; Customhouse; the Exchange; the Four Courts, on the N. side of the river, between Whitworth and Richmond Bridges, an imposing classical building, consisting of a centre, flanked by a square on each side, and occupied by the Superior Courts and Courts of Chancery, Queen's Bench, Common Pleas, and Exchequer; the Roman Catholic University; Nelson's Monument (134 feet), from which a fine view of the city and environs is obtained; the Royal Irish Academy, containing a valuable collection of national antiquities; the National Gallery of Ireland, with collections of works in sculpture and painting; the Cathedral of Christ Church, to the W. of the castle, opened after a very fine 'restoration,' in May 1878; and the Exhibition Palace, in which the International Exhibition of 1865 was held, and in which oratorios and concerts on a large scale are now occasionally given. The societies, hospitals, educational institutions, and theatres are numerous. Of the parks and squares, the chief are the Phœnix, in the extreme W. of the city, and on the N. side of the river, a magnificent enclosure of 1752 acres, in which military displays frequently take place, and containing the Wellington testimonial, an obelisk 205 feet, and erected in memory of the great Duke's achievements, at the cost of £20,000; St Stephen's Green (20 acres); Merrion Square (13 acres); College Park; Rutland Square, &c. The Rotunda, between Sackville Street and Rutland Square, is a noble suite of public rooms for concerts and festive and other meetings. D. is the seat of an Anglican and Roman Catholic archbishop. The S.W. district of the town, named the *Liberties*, was at one time occupied by an industrious and prosperous community of silk-weavers, the descendants of a Huguenot colony that settled here in the reign of William III. The silk industry has died out in the locality, and the Liberties now comprise the most squalid, unattractive, and turbulent quarter of the city. No national manufacture except that of Irish poplin centres in D., and the industrial establishments, cotton and linen fabrics, breweries, distilleries, &c., are engaged mainly in the supply of local wants. Water communication with the W. and S. of Ireland is maintained by the Royal and Grand Canals; from five railway stations lines of railway radiate to different parts of the country, but the most valuable means of access is the port of D., from which large steamers ply regularly to Holyhead, Liverpool, and Glasgow. The harbour, which freely admits vessels of 900 tons, has been greatly improved by the construction of two breakwaters. In 1873, 8104 vessels of 1,692,990 tons entered and cleared the port. The total value of the imports in 1874, consisting chiefly of wheat and other cereals, wine, spirits, sugar, petroleum, timber, and jute, was £3,316,073; the total value of the exports (1874), consisting chiefly of chemical products and preparations, spirits, glass goods, and beer, was £50,178. The amount of customs revenue for 1874 was £868,455. Pop. (1871) 246,326, of whom 195,180 were Roman Catholics; pop. (1875) of parliamentary borough, 314,666. The city and the University return two members to Parliament respectively. D. is first mentioned by Ptolemy. It originally occupied the ridge that now forms its centre, and was occasionally called in Irish Gaelic *Drum-Col-Coille*, 'hill of hazelwood.' Its early history is veiled in obscurity. The Danes held it from 836 till the end of the 12th c. It capitulated to the English in 1169, and was subsequently visited by Henry II., who granted its first charter. The English strengthened the fortifications, and erected a castle (1220). Various charters and privileges were received from Henry III., Edward I., and Henry IV. The city, which had been in great part destroyed by fire, was rebuilt and extended from 1316. Many great improvements have been made since the 18th c. The abortive attempt at insurrection planned by Robert Emmett took place in D. in 1803. See Gilbert's *History of D.* (Dublin, 1862).

Dublin, a maritime county of Leinster, Ireland, having the Irish Sea on the E., and inland the counties of Meath, Kildare, and Wicklow. Length, 32 miles; average breadth, 12 miles; area, 226,895 statute acres, of which 100,236 are under tillage, 91,503 in pasture, 4716 under wood, while 30,440 are waste lands—bog, hill, &c. There are 50,754 inhabited dwelling-houses, and 23,020 out-offices and farm-steadings. Pop. (1871) 405,262. The coast is 50 miles in length; its chief features are Dublin Bay (6 miles wide and 7 deep) and the Hill and Head (500 feet high) of Howth. Off the shore are the Skerries, Ireland's Eye, and Dalkey Island. The surface is flat, with the Wicklow Hills occupying the S. border. The climate is temperate; the prevailing winds are from the W.; and the soil, for the most part shallow and gravelly, is productive in the districts around the capital and lying along the borders of Meath. The chief crops are cereals and potatoes. The cattle in 1875 numbered 53,764. The principal river is the Liffey. D., the capital, and Kingstown are the chief towns, and all the manufactures of the county (sewed muslins, cottons, &c.) are carried on in and around the former. The county contained in 1871 266 primary and 89 superior schools, including three colleges.

Dublin University, or Trinity College, Dublin, founded by Queen Elizabeth, was incorporated by charter or letters patent on the 3d March 1591, under the title of 'The College of the Holy and Undivided Trinity near Dublin.'

History.—In 1591 the city of Dublin presented to it, by free grant, the 'site, ambite, and precincts of the former monastery of All Saints or All Hallowes.' The building was begun on the 13th March 1591, and was open to receive students on the 9th January 1593. In 1595 the Queen granted to the College lands to the value of £100 per annum, and in 1610 James also granted to it lands in Armagh, Fermanagh, and Donegal. Since the foundation of the College, charters and Acts of Parliament have been passed, extending the privileges of the University, and making such alterations as were from time to time deemed necessary. In 1613 James I. granted to its Provost, Fellows, and Scholars the right of electing two burgesses to represent the University in Parliament. By the Act of Union (1800) the number of representatives was reduced to one, but the right to elect two members was restored to D. U. in terms of the Irish Reform Bill (2 and 3 Will. IV. c. 88). In 1637, by charter of Charles I., fellowships were made tenable for life; the power of making statutes was taken from the Provost and Fellows, and reserved to the crown, and the crown assumed the privilege of appointing the Provost. The statutes of Charles I. underwent considerable modification between 1637 and the middle of the present century. They were revised in 1855 on the recommendation of a royal commission, but the constitution of D. U. was not thereby materially affected. By enactment the provostship, fellowships, and foundation scholarships could only be held by members of the Church of Ireland, but the Act 36 Vict. c. 21, removes all religious disabilities. An unsuccessful attempt to affiliate D. U. with the Catholic University, Magee College (Belfast), and the Queen's Colleges of Cork and Belfast, led to the defeat of the Gladstone Government, 11th March 1873. In 1874 it was enacted that a *University Council* should be elected to co-operate in the regulation of the studies, lectures, and examinations, and in the appointments and regulation of the tenure of office and the duties of professors. No new professorship can be created by the Provost and Senior Fellows without the consent of the Council.

Constitution and Government.—By the charter of foundation Queen Elizabeth appointed one Provost and three Fellows and three Scholars (in name of more) to conduct the business of the corporation, confer degrees, elect officials, &c. The original constitution is still maintained, and the Provost and Senior Fellows form a board of management, whose acts must receive the sanction of the Senate.

Church Patronage.—The right of presentation to a number of livings was vested in the Provost and Senior Fellows in 1610, but all rights of church patronage were swept away by the Irish Church Act, 32 and 33 Vict. c. 42.

The *Senate* consists of the Chancellor and such Doctors or Masters as have their names on the college books.

The *Caput* of the Senate consists of the Chancellor or his official representatives, the Provost or Vice-Provost, and the Senior Master non-regent.

Order of Rank in the College.—The *Provost*, who is appointed by the crown. The *Fellows*, absolved from the obligation to enter into priest's orders by letters patent of 1874, and who become Seniors in the order of seniority, are chosen by examination. They, with the professors, form the examining staff. The

Junior Fellows, with the professors, form the lecturing staff. The teaching in the obligatory courses in Arts is chiefly performed by the Junior Fellows, most of whom are tutors. *Noblemen, sons of noblemen*, and *Baronets*, who enjoy special privileges. *Doctors* in the three Faculties, *Bachelors in Divinity*, and *Masters of Arts, Surgery, and Engineering* are entitled to vote at the election of parliamentary representatives, so long as their names are on the college books. *Fellow Commoners* have the privilege of dining at the Fellows' table. *Scholars* on the foundation, who number seventy, have free commons, pay only half the usual fees for rooms and tuition, are exempt from college charges or *decrements*, and receive from the college an annual salary. *Pensioners*, who form the great majority of the students. *Sizars*, or poor students, have free commons, and are exempted from fees, are admitted by annual examination, and hold their sizarships for four years. The number of Sizars is restricted to thirty.

Entrance is by examination in classics, composition, &c. Each student on entrance places himself under the tuition and guardianship of a Tutor-Fellow.

Terms, Course, &c.—There were formerly four terms; there are now (since 1833) only three—viz., *Michaelmas*, or October Term, beginning 10th October, ending 20th December; *Hilary*, or January Term, beginning 10th January, ending on the Feast of the Annunciation; and *Trinity*, or Midsummer Term, beginning 15th April, ending 30th June. Students in the first and second years of their undergraduate course are named Junior and Senior Freshmen; in the third and fourth years, Junior and Senior Sophisters; in the fifth year, Candidate Bachelors; and after graduating B.A., Junior, Middle, and Senior Bachelors. Terms are kept either by residence and attendance on lectures, or by passing the term examinations.

Professors.—There are nearly forty professors in Divinity, Law, Arts, and Science, and also assistant professors and lecturers. Of the professorships founded within recent years, the more important are the Professorship of Irish (founded 1840), of Ecclesiastical History (1850), Regius Professorship of Surgery (1852), Civil Engineering (1852), Arabic, Hindustani, and Persian (1856), Latin (1870), and Comparative Anatomy (1872).

Degrees are publicly conferred by the Chancellor or Vice-Chancellor in the senate or congregation of the University. No oath or declaration need be made by any candidate to obtain a degree. To take the degree of B.A. the student must keep the terms, and pass an examination at the end of his second year, and another at the close of his curriculum. A *Master of Arts* must be B.A. of three years' standing; a *Bachelor in Divinity* must be M.A. of seven years' standing; a *Doctor in Divinity* must be B.D. of five years' standing, and in priest's orders. For the degrees of Bachelor in Laws, Medicine, Surgery, and Civil Engineering, candidates must first have graduated B.A.

Studentships.—By letters patent of 1858, fourteen studentships are founded, at a salary not exceeding £100 per annum for each, tenable for seven years, and open to all religious denominations.

Dubnit'za, a small town of European Turkey, province of Rumili, 75 miles W. of Philippopolis. Pop. about 6000, employed in the ironworks and vineyards of the vicinity.

Dub'no (Slav. 'the oak-wood'), a town of European Russia, government of Volhynia, 70 miles N.E. of Lemberg in Austrian Galicia. Here from 1774 till the annexation of Western Poland by Russia the Polish nobility held their annual session. The great fairs formerly held here are now held in Kiev. Pop. 7687.

Du'bois, Guillaume, Cardinal, one of the most successful but least respectable statesmen France has produced, was the son of an Auvergnese apothecary, and was born at Brives-la-Gaillarde, 6th September 1656. He became tutor to the Duc de Chartres, and maintained his influence by encouraging the vices of his patron. When the latter, as Duc d'Orleans, became Regent in 1715, D. rose to the first position in France. In 1717 he contributed largely to the negotiation of what is known as the 'triple alliance' between Britain, Holland, and France, which changed, for the time, the traditional policy of his country. In 1720 he became Archbishop of Cambray; in 1721 a cardinal. D. died at Versailles, August 10, 1723, a victim to his own debauchery. He was, however, an able statesman, and in a less vicious and sensual age might have proved a blessing to France. The *Mémoires* which appeared under his name (Par. 4 vols. 1829) are not authentic.

Dubov'ka, a market-town and river-port of European Russia, in the government of Saratov, on the right bank of the Volga. An active trade in corn, fish, and cattle was formerly carried on between D. and Katchalinsk on the Don, but is now somewhat decayed. Pop. 12,030.

Dubuque', a flourishing city of Iowa, on the right bank of the Mississippi, 199 miles W. of Chicago. The principal buildings are the market-house, city hall, and customhouse. It is a great depôt for the Iowa lead-mining, about half a million dollars being exported annually. D. has a trade in flour, timber, shot, &c. It is connected both E. and W. with important railroads, and has a large river traffic by the Mississippi. There is a German Presbyterian Theological School here. The town derives its name from a Frenchman who attempted a settlement in 1788, but the first permanent settlement began in 1830. Pop. (1870) 18,435.

Ducange'. See DUFRESNE.

Du'cas, Michael, a Byzantine historian, who flourished towards the middle of the 15th c. After the capture of Constantinople in 1453 by the Turks, D. sought a retreat in Lesbos, and was employed by the tributary prince of that island in various diplomatic missions to the Turkish sultans. On the annexation of Lesbos to the Ottoman Empire in 1462, he retired to Italy, and there composed his *Historia Byzantina*, commencing with the creation of the world, and ending with the taking of Lesbos. D.'s history is a valuable authority for the reigns of Joannes Paleologus and his successors Manuel, Joannes, and Constantine. It also contains a reliable account of the siege and sack of Constantinople, and has been largely used by Gibbon, who remarks that D. 'writes with truth and freedom; but the style is a barbarous obscure jargon, full of Turkish words and strange constructions.' A folio edition of the *History* was published in Greek and Latin at Paris (1649). It was also edited by Bekker (1834) for the Bonn series of Byzantine historians, along with an early Italian translation found at Venice by Ranke. It has been translated into French by Cousin.

Duc'at (Ital. *ducato*, from Lat. *dux*, 'a leader' or 'duke'), a coin, generally of gold, but sometimes of silver, first coined in Sicily in the 12th c. The D. was a favourite coin, and was issued from all the German mints, and from most of those in N. Europe. The value of a D. in Austria, Russia, and Hamburg is about 9s. 4d.; the silver D. of Sicily is 3s. 4d.; and the Spanish plate D., 4s. 2d.

Duca'to, Cape (anc. *Leucatas*), the S. extremity of Santa Maura, one of the Ionian Islands (the ancient *Leucas* or *Leucadia*). It still retains the evil reputation it had of old as a promontory dangerous to the mariner. On its W. side is the famous 'Lover's Leap' of Sappho, a rugged white cliff rising 2000 feet perpendicularly from the sea.

Du'ces Te'cum is the name of a writ in English law commanding a person to appear in court, and to bring with him writings or other proof which may be required in an action. In Scotch law, a 'diligence against havers' is nearly equivalent to the English writ of D. T. See DILIGENCE, HAVERS.

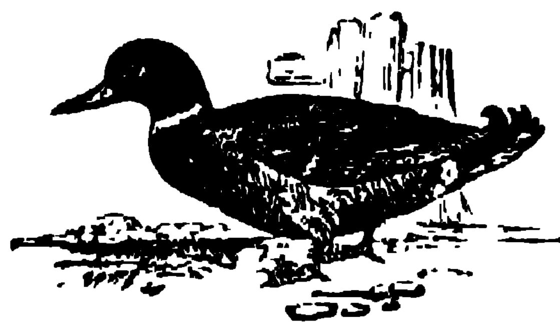
Duchesne', André, an industrious French historian and genealogist, was born at Isle-Bouchard, Touraine, in 1584, became royal geographer and historiographer, and died 30th May 1640, being crushed under a cart while on his way from Paris to his country-seat. His labours obtained for him the title of *Père de l'Histoire de France*. Among his most valued works are *Historiæ Normannorum Scriptores Antiqui* (1619), *Histoires Généalogiques des Maisons Célèbres* (1621–31), and *Historiæ Francorum Scriptores* (1636–49).—His son, **François D.**, who was born at Paris in 1616 and died in 1693, followed in his father's footsteps, finished some of his works (the elder D. left upwards of 100 volumes in MS.), and also filled the post of historiographer. He wrote chiefly on ecclesiastical history, and among his best works are a *Histoire des Papes* (1653) and a *Histoire des Cardinaux Français* (1660–66).

Duchobort'zi ('spirit-fighters'), a mystic sect in Russia, in some points resembling the Quakers, and distinguished chiefly by their disregard of the sacraments, and by having neither priests nor churches. They received their name from refusing to take the oath of military service. The first D. appeared in

Moscow and other cities about the beginning of the 18th c., and during the reigns of Catherine II. and Paul I. were severely persecuted, but complete toleration was granted them by Alexander I. They then settled in the S. of Russia, on the Molochna, living in peace and order till the appearance of an impostor named Kapustin, whose doctrine of transmigration, and profession of being animated by the soul of Christ, led to dissension and bloodshed. In 1841 the sect was removed to the district of Achalkalaki in Trans-Caucasia. There they still occupy a plateau some 6000 feet above the sea, and live chiefly by cattle-rearing. They are about 3000 in number, and are divided into seven villages.

Duck, a stout linen fabric used for labourers' smockfrocks and workmen's aprons, &c.

Duck, the name applied to numerous genera and species of Natatorial or Swimming-birds, belonging to the section *Lamellirostres*, and to the family *Anatidæ* of that order. The true Ducks (sometimes included to form the sub-family *Anatinæ*, as distinguished from such forms as the *Fuligulinæ*, or pochards, mergansers (*Merginæ*), and allied birds, are distinguished by the hinder toe being small and rudimentary, by its being provided with a narrow membranous lobe, and by its being unconnected with the other toes by the web or membrane. The *laminæ*, or plate-like structures in the upper bill, are large and projecting; and the *tibiæ*, or shins (as in the pochards), are naked at their extremities. The ducks are gregarious in habits, and usually migrate in large flocks. The males are generally larger than the females, and whilst the former are gaily coloured, the latter are usually of darker tints. They frequent fresh waters, and grope for their food, consisting of insects, larvæ, worms, &c., amongst the mud. They usually moult twice a year, in June and November, and at the former period the males exhibit the less gaudy plumage of the females. The nest is rudely constructed on the ground, usually among the reeds fringing lakes and rivers. The eggs may number fourteen, and the young are markedly active from the moment after quitting the egg.


Wild Duck

Good examples of this extensive sub-family (in which the *trachea* or windpipe is of curiously twisted conformation, and produces the harsh cry of these birds) are the common D. (*Anas boschas*), or mallard, the original stock from which our domestic varieties have been derived. (See MALLARD.) These birds in their wild state select each a single mate, the male attending the female during incubation; whilst curiously the ordinary domestic drakes, like the cock, usually mate with numerous partners. Included in the sub-family *Anatinæ*, with the true Ducks, are the Teals (*Querquedula*), Widgeons (*Mareca*), Shoveller Ducks (*Anas*), and Pintails (*Dafila*), all of which are described in the special articles of these names.

Duck-Bill. See ORNITHORHYNCHUS.

Duck'ing-Stool, a contrivance consisting of a rude chair fixed on the end of a beam, working on a pivot in the centre, and capable of being lowered or raised at pleasure. This beam extended over a dam or river, and its purpose was the punishment of scolding wives. The culprit was placed in the chair and ducked in the water sufficiently often to cool her temper. The use of the D.-S. began in the latter part of the 15th, and was common until the middle of the 18th c. A D.-S. preserved at Leominster was actually in use as late as 1809.

Duck'weed (*Lemna*), a genus of minute floating plants, belonging to the natural order *Araceæ*, or, according to most modern authors, to a separate order, *Lemnaceæ* or *Pistiaceæ*. The green covering of stagnant pools is due to one of the species, viz., *L. minor*. Four in all are natives of Britain. The root, surrounded by a sheath or *ampulla*, hangs loosely in the water, while the flowers, which are rarely seen, and are without calyx or corolla, spring out from immediately beneath the little roundish green frond. They increase rapidly, and bud from the margin of the fronds.

Duclos, Charles Pineau, a witty French writer of memoirs, romances, essays, &c., was born at Dinan, February 12, 1704. In 1746 he was made a member, and afterwards perpetual secretary, of the Academy. He died at Paris, March 26, 1772. His chief works are his *Considérations sur les Mœurs de ce Siècle* (1750), *Mémoires pour servir à l'Histoire du Dix-huitième Siècle*, and *Mémoires Secrets sur le Règne de Louis XIV., la Régence et le Règne de Louis XV.* (1791). See his *Œuvres Complètes* (10 vols. Par. 1806).

Ducrot, Auguste-Alexandre, a French general, was born at Nevers in 1817, served in Algeria, and in the Italian campaign of 1859, and was made general of division in 1865. On the outbreak of the German war he was placed at the head of the first division of the first army corps, under Marshal MacMahon. He fought well at Sedan, and refused to sign the capitulation treaty. Escaping from prison at Pont-à-Mousson, he took an active part in the defence of Paris, and subsequently became a member of the National Assembly (1871), and was appointed commander-in-chief of the eighth corps in 1872. He is the author of *La Journée de Sedan* (1871), *De l'État-major et des Différentes Armes* (1871), and *La Vérité sur l'Algérie* (1871), &c. D. is strongly opposed to democracy.

Duct, an anatomical term signifying the tube which conveys the secretion away from a gland. Thus we have the D. of the liver, the D. of the parotid gland, &c.

Ductil'ity, the property possessed by various solids of being drawn out to a great length without fracture. This property is most marked in metals—gold, silver, and platinum being the most ductile. A grain of gold can be spread over an area of 225 sq. feet, and a platinum wire has been obtained $\frac{1}{30000}$th of an inch in diameter, by drawing it out in the interior of a silver wire, which was then dissolved away by nitric acid. At high temperature glass threads may be drawn of extreme thinness and flexibility. As D. is obviously a property depending upon molecular forces, it must be affected considerably by variation of temperature.

Du Deff'and, Marie de Vichy Chamrond, Marquise, born in 1697, was educated at a convent in Paris, and in 1718 married J. du D., Marquis de la Lande, a union which was shortly dissolved. She then mingled with the gayest and most polished Parisian society, became the centre of a brilliant literary coterie, and is said to have formed many liaisons. Voltaire admired her wit, and corresponded with her in prose and verse. About 1753 she nominally retired to a convent in the Rue St. Dominique, but by means of a secret stair continued to receive the most distinguished literati of the day, and among others Boufflers, Montesquieu, Hume, Walpole, Voltaire, and D'Alembert. She died at Paris, September 24, 1780. Madame D. was an icy-hearted, dazzling woman, of a type almost peculiar to the 18th c. She left no work except her letters, which D'Alembert pronounced to be models of epistolary style. See *Correspondance inédite de Madame D.* (3 vols. 1810); Walpole's *Correspondence;* and above all, the Marquise de Saint-Aulaire's *Correspondance Complète de Mme. du D. avec la Duchesse de Choiseul, l'Abbé Barthélemy et M. Craufurt* (2 vols. 1860; new ed. 3 vols. 1878).

Du'devant, Madame. See SAND, GEORGE.

Dud'ley, a town in an isolated part of Worcestershire, surrounded by Staffordshire, 8½ miles W.N.W. of Birmingham, is largely engaged in the iron and glass trade. Overlooking the town is a ruined castle. In 1876 a new church of St. Luke was opened. D. returns one member to Parliament. Pop. (1871) of the municipal borough, 43,782; of the parliamentary borough, 82,249.

Dudley Limestone, a limestone of Silurian age, included in the subdivision of that period known as the Wenlock Series, and so named from its rich development near Dudley (q. v.), as at Wren's Nest and Castle Hill. Its chief fossils consist of Crustacea or Trilobites—among which is the famous 'Dudley locust' (*Calymene Blumenbachii*)—corals, polyzoa, mollusca, and echinodermata.

Du'el (Ital. *duello;* Lat. *duellum*, the original form of *bellum*, 'a war between *two* parties'). Duelling, as a judicial trial, had its origin in that primitive state of society in which might is held, not only as the origin of right, but as the principle by which right is transmitted. No doubt a superstitious belief that God would directly interfere in the combat, and guilt be so ascertained, was

also at the root of the practice during the middle ages. Trial by battle was then a congenial institution, fighting, plundering, and revenge being almost the only serious business of the feudal barons. Ludwig the Pious was the first Frankish king who allowed litigants to decide their dispute by arms. To some extent the practice was introduced into England by William the Conqueror. Females were not called on to submit to the trial, but all males were, between fifteen and sixty years old; ecclesiastics being allowed to fight by proxy. The D. has especially thriven in France. During the first eighteen years of the reign of Henri IV., 4000 gentlemen are said to have been killed in personal combat. It is to the credit of that monarch that he opposed the practice. In 1602 he alluded to it with disapprobation in an edict dated from Blois; and in 1609 he added to penalties already imposed confiscation of goods, imprisonment, and degradation of all concerned in the combat. These measures were probably, however, rather due to the influence of the Duc de Sully than to the feelings of Henri himself; nevertheless the Comte de Boutteville and the Marquis de Beuron were beheaded for fighting in opposition to the royal edict. During the minority of Louis XIV., a series of bloody combats between noblemen took place in France. On one occasion the principals, the Dukes of Beaufort and De Nemours, fought with four friends on each side. Nemours and two others were killed. Such events determined the King to do all in his power to stop the practice. In 1679 he issued an edict against it, and the terms of this edict he resolutely enforced, refusing pardon to all offenders. In England the D. was never so much in fashion as in France; eventually the trial by battle was allowed, so late as the reign of Elizabeth. It was allowed indeed, though not resorted to, in the present century. (See BATTEL, TRIAL BY.) In consequence of a D. between the Duke of Hamilton and Lord Mohun in 1712, in which the former was killed by the latter, with circumstances presumptive of murder, a bill was brought into Parliament to restrain the practice, but was rejected. In 1765, a famous D. was fought between Lord Byron and Mr Chaworth, the subject of quarrel being the quantity of game on their respective manors. Mr Chaworth was killed. In the D. between Major Campbell and Captain Boyd in 1808, the latter was killed, and the former hanged for murder, on the dying declaration of Boyd that he had been bullied into fighting privately and without seconds. The last fatal duel in England was, we believe, between Colonel Munro and Captain Fawcett, in 1844. The former killed the latter, and fled from the country. He returned a few years afterwards, was tried and found guilty of homicide, and punished by imprisonment.

Duelling, Law Regarding.—To kill any human being with deliberate intention of doing so is, in law, murder; and the act is not palliated by the preface of a challenge, nor by the doer hazarding his own life by the deed. Nor will any provocation lessen the degree of crime. To kill a man in a *deliberate* duel under provocation of calumny, however great, constitutes *murder* against principal and second, and against the second of the deceased. Such is the doctrine of the law, but it is never strictly enforced unless the conduct of the accused has been considered dishonourable. It has been enforced where it was held proved that the man killed was coerced by his opponent into fighting privately and without seconds.

In 1844, in accordance with the spirit of the age, three new articles of war were issued, with the view of abating duelling in the army. Officers in any way concerned in a duel, even negatively, by not endeavouring to prevent an intention to fight of which they are aware, are liable to be cashiered or to minor punishment. Approbation is to be given to those who, having given offence, endeavour by explanation or apology to obviate it, and to those who readily accept apology or explanation. Where adjustment is by these means found to be impossible, it is recommended to submit the matter to the arbitration of the commanding officer.

Duet′, or **Duet′to**, a piece of music for two performers. The form *duo* is also sometimes employed.

Duff, Rev. Alexander, D.D., LL.D., a distinguished missionary, was born 25th April 1806, in the parish of Moulin, Perthshire, educated at the University of St. Andrews, and in 1829 was sent out by the Church of Scotland as its first missionary to India. At Calcutta he threw himself into the work of educating and Christianising the natives of India with great energy; and the institution which he founded in Calcutta for aiding both works is the largest of the kind in India. In 1836 D. visited Scotland, and endeavoured to diffuse a missionary spirit into its Churches; the following year, in recognition of his services, he received the degree of D.D. In 1843, with all the other Scotch missionaries in India, he joined the Free Church, and in 1851, on a second visit to Scotland, was appointed Moderator of the Free Assembly. In December 1863, ill-health compelled D. to quit India finally. On his return to Scotland he was appointed Professor of Evangelistic Theology in the New College, Edinburgh. In 1873 he was a second time made Moderator of the Free Assembly. He died at Sidmouth, Devonshire, 12th February 1878, and received the honour of a public funeral in Edinburgh. D.'s chief works are *New Era for the English Language and Literature in India* (Edinb. 1837); *India and Indian Missions, Missions the Chief End of the Christian Church*, and *Qualifications, Duties, and Trials of an Indian Missionary* (all in 1839); *The Jesuits, their Origin, &c.* (1850); and *Letters on the Indian Rebellion* (1858). D. established and for a time edited the *Calcutta Review*, and contributed materials for the celebrated India Education Despatch of 1854.

Dufour′, Guillaume Henri, a distinguished Swiss general, was born at Constance, 15th September 1787, studied at the École Polytechnique, in Paris, and became an officer of engineers under Napoleon I. in 1809. In 1831 he was appointed chief of the Swiss general staff, and directed the trigonometrical and general survey of the country, the result of which appeared in the map of Switzerland, twenty-five sheets, 1842-65. He led the Swiss army in 1847, and brought the Sonderbund War to a rapid close by the victories of Freiburg and Lucerne. For these services he received from the Diet a 'sword of honour' and a gift of 40,000 francs. His conservatism, however, alienated the democrats of Geneva, who contrived to deprive him of his public offices in 1848. Nevertheless he still acted frequently as a secret or official embassy between the Diet and the court of the Tuileries, and was returned to the Council of Geneva in 1856. An international conference as to the treatment of wounded in time of war, held at Geneva, was presided over by D. in 1864, and he also presided at the festival of the reunion of Switzerland and Geneva in 1869. D. died at Geneva, 14th July 1875. He wrote a *Treatise on the Artillery of Ancient and Mediæval Times* (1840), a *Manual of Military Practice* (1842), and *Permanent Fortification* (1850).

Dufresne′, Charles, Seigneur Du Cange, a distinguished historian and philologist, born of an ancient and noble family of Picardy, December 18, 1610, at Amiens, at the Jesuit College of which he received his early education. He afterwards studied law at Orleans, became parliamentary advocate in Paris in 1631, but retired to Amiens to devote himself exclusively to study. D. died at Paris, 23d October 1688. He was familiar with the languages, the laws, the archæology, and palæography of antiquity. For erudition, at once wide and deep, he was the most distinguished man of his century. His two greatest works are the *Glossarium ad Scriptores Mediæ et Infimæ Latinitatis* and the *Glossarium ad Scriptores Mediæ et Infimæ Græcitatis*. The former, published in three vols. at Paris in 1678, was extended by the Benedictines of St Maur to six vols. in 1733, and to ten vols. (by the addition of a supplement by Carpentier) in 1766. The firm of Didot produced a new edition, edited by M. Henschel (Par. 1844), and a second supplement was produced by Diefenbach (Frankf. 1857). Of the latter work, originally published in Paris in 1688, a second edition was published by Didot. Among his historical works, the chief are the *Histoire de l'Empire de Constantinople sous les Empereurs Français* (Par. 1657), and the *Historia Byzantina* (Par. 1680). Very valuable also are the following monographs—*Johannes Einnamus* (Par. 1670), *Johannis Zonaræ Annales* (1687), and the *Chronicon Paschale* (1688). D.'s humour and his gracious and sociable disposition won for him as many friends as his vast learning gained him admirers. See Feugère's *Études sur Du Cange* in the March and April parts of the *Journal de l'Instruction Publique* (Par. 1852).

Dug′dale, Sir William, one of the first of British archæologists, was born at Shustoke, Warwickshire, 12th September 1605. Encouraged by his father in historical and antiquarian studies, he became at a comparatively early age a pursuivant-at-arms, and after the accession of Charles II., whom he had always,

as a Royalist, supported, was appointed Norroy King-at-arms, and finally Garter King-at-arms, while about the same time he was knighted. He died 10th February 1686. He bequeathed twenty-seven folio MS. volumes to the University of Oxford, which are now in the Bodleian Library, Ashmolean Museum, and Heralds' College. Among his works are *Antiquities of Warwickshire* (1656), *The Ancient Use of Bearing Arms* (1682, new ed. 1811), *Historical Memoirs of the English Laws* (1666, 3d ed. 1680), and above all, *Monasticon Anglicanum* (1655-73), of which D. was rather the editor than the author, and of which an enlarged edition was issued by Bandinel, Caley, & Ellis in 1817-30 (new ed. 1846). The autobiography of D. is to be found in the 2d ed. of his *History of St Paul's Cathedral* (1658). It was reprinted by Hamper, with his journal and correspondence, in 1827.

Dugong' (*Halicore*), a genus of Sirenian (q. v.) mammalia, allied in some respects to the Cetacea or Whales, and found on the eastern coast of Africa, on the shores of the Indian Ocean, on the coasts of Ceylon, and in N. Australia. This genus is distinguished by the crescentic form of the tail-fin. The incisor teeth, which the males alone possess, are of large size, and number two in the upper jaw, none existing in the lower jaw, and the only other teeth being ten molars in each jaw. No dorsal fin is present, and the hind limbs are wholly wanting. No outer ear is developed. There is only one set of teeth, and these possess no enamel or roots. The heart in the D. is deeply cleft externally at its apex, so that the ventricles are separated for about half their extent. These animals may attain a length of 26 feet. They are herbivorous, and frequent the shallow waters of coasts and the estuaries of rivers. The mammary glands are situated on the breast.

Duguay'-Trouin, René, a French admiral, was born at St Malo, June 10, 1673, and early showed a passion for the sea. As commander of a privateer in the war against England and Holland, he gained the notice of Louis XIV., who presented him with a sword, and in 1697 gave him the command of a frigate. His subsequent career was very brilliant; it was affirmed in the letters of nobility granted him that he had taken twenty ships of war and 300 merchant-ships. His fame reached its climax in 1711, when he captured Rio Janeiro, which had to be ransomed for 610,000 crusados. D.'s last achievement was, in 1731, to chastise the pirates of the Levant, who had been injuring French commerce. He died at Paris, 27th September 1736. The *Mémoires* of D., published by Beauchamps (4 vols. Par. 1740), show him to have been in private a good and modest man; his ruling passion was devotion to Louis XIV. See also *Histoire de D.* by M. De la Landelle.

Du Gues'clin. See GUESCLIN, BERTRAND DU.

Dui'da, a mountain of Venezuela, S. America, perpendicular in the S. and W., bare at the summit, and clothed where it is less steep with vast forests. It is 8500 feet high, and for hundreds of miles is a landmark to voyagers on the Orinoco.

Du'isburg, a town of Rhenish Prussia, 15 miles N. of Düsseldorf, and connected by a canal both with the Ruhr and the Rhine. It has important woollen, cotton, hosiery, leather, soap, and glue manufactures, some sugar-refining, and a growing trade in wine and colonial produce. Coal is worked in the neighbourhood. D. is very old, being mentioned in the time of the Frankish kings. It was a member of the Hanseatic League, and came into the possession of Prussia in 1815. Pop. (1871) 30,533.

Duke (Lat. *dux*, Fr. *duc*, Span. *duque*) was originally a military title in use in the Roman Empire. It appears to have come into use along with the title of Count (q. v.), on the separation of the military from the civil command, in the reign of Constantine. All provincial generals then became dukes; 'but,' according to Gibbon, 'no more than ten among them were dignified with the rank of counts or companions, a title of honour, or rather of favour, which had been recently invented in the court of Constantine. A gold belt was the ensign which distinguished the office of the counts and dukes, and besides their pay they received a liberal allowance, sufficient to maintain 190 servants and 158 horses. They were strictly prohibited from interfering in any matter which related to the administration of justice or the revenue, and the command which they exercised over the troops of the department was independent of the authority of the magistrate.' On the decay of the Roman Empire, the more purely military rank of D. began to take precedence of that of count. In France, provinces were acquired by the various dukes, who so increased in number and in power as almost totally to eclipse the authority of the crown, the right to dispose of which they arrogated. They assumed the state of princes, coining their own money, and making war in their own name. Towards the close of the 15th c., Charles, surnamed the Bold, D. of Burgundy, was perhaps the richest and most powerful prince of his time. When Count of Charolais, in alliance with the D. of Bretagne, he made war against Louis XI., King of France. They defeated the king at Montlhéry, and threatened to take Paris. The result was a treaty by which the counties of Boulogne, Guines, and Ponthieu, with several towns on the Somme, were ceded to Charolais. With his ultimate defeat, when D. of Burgundy, on 5th January 1477, may be said to have ended the power of the French dukes as opposed to that of the crown. The Archduke Maximilian marrying the heiress of Charles the Bold, their daughter was by treaty, in 1482, betrothed to the eldest son of Louis XI., afterwards Charles VIII., and the counties of Burgundy and Artois were handed over to France. The Duchy of Bretagne fell to François I. of France by marriage in 1532. The duchies subsequently given to members of the royal family of France, and to other distinguished subjects, were entirely subject to the crown. The holders were of the first rank of the nobility of France; but their power and position were totally different from that of the former dukes.

In England the title of D. was from the first merely a title of honour. The first English D. was the Black Prince, created D. of Cornwall by his father, Edward III., in 1335. In 1350 the same king created his cousin Henry D. of Lancaster, on whose death the king conferred the duchy on John of Gaunt and his heirs for ever, apart from the crown. The oldest extant dukedom in England is that of Norfolk. Sir William Howard was a Chief-Justice of the Common Pleas in the reigns of Edward I. and Edward II. Sir John Howard, a grandson of the judge, was Sheriff of Norfolk, and held other important posts. His grandson, Sir Robert Howard, married the co-heiress of the noble house of Mowbray, and was created Lord Howard and D. of Norfolk in 1483.

The English D. ranks after the peers of the royal blood and the two Archbishops of York and Canterbury. In 1876 there were twenty-one dukes in England, namely, Norfolk, whose title was created as early as 1483, Somerset (1546), Richmond (1675), Grafton (1675), Beaufort (1682), St Albans (1684), Leeds (1694), Bedford (1694), Devonshire (1694), Marlborough (1702), Rutland (1703), Brandon (1711), Portland (1716), Manchester (1719), Newcastle (1756), Northumberland (1766), Wellington (1814), Buckingham and Chandos (1822), Sutherland (1833), Cleveland (1833), and Westminster (1874). There are also seven Scottish dukes and one Irish D., but these only sit in Parliament as marquises, earls, viscounts, or barons.

In Scotland, the title of D. of Albany (q. v.)—an ancient name for Gaelic Scotland—was conferred by an Act of the Scotch Council on the brother of King Robert III., then Regent, in June 1398. The title was forfeited by the son of the first D. Conferred again on Alexander, son of James II. of Scotland, it became extinct in 1536. It was conferred on Lord Darnley, on Charles I., on James II., and on Frederick, second son of George III. See ARCHDUKE.

Duke of York's School (properly **The Royal Military Asylum**), an institution for the support and education of the children of soldiers and non-commissioned officers at Chelsea, was founded by the Duke of York in 1801. It is supported by a parliamentary grant under the Army Estimates. At first both male and female children were on the foundation, but now only males, who must have lost one or both parents, are admitted. The boys are under no obligation to enter the army after completing the course of education, but nearly all of them do become soldiers, and many of them enter the regimental bands. Those who are not fit for the army on leaving the school are apprenticed to trades. In 1875 the number of boys in the school was 458. The proportion of boys from this school who enter the army every year is 86 per cent. The establishment of the school is now (1876) raised to 500 boys, which will be

carried into effect as soon as the requisite accommodation is provided. The Normal School for the training of army schoolmasters forms a branch of this institution, and consists of forty-two students and pupil-teachers.

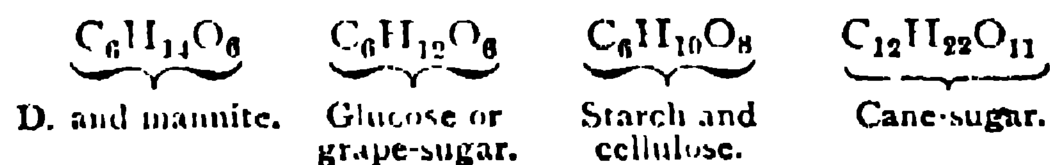
Dukinfield, a town in Cheshire, England, 7 miles N.N.E. of Stockport, has extensive collieries, cotton-factories, and fire-clay works. Pop. (1871) 14,085.

Dulcign'o (Turk. *Olgun*, Slav. *Mkronich*, near the ancient *Olcinium*), a seaport of Turkey, vilayet of Scutari, or Upper Albania, not far from the mouth of the Bojana, on the Adriatic, 18 miles S.W. of Scutari. It is the seat of a Catholic bishop, and has a fort, and an active trade in oil and timber. Pop. 7000.

Dul'cimer, an ancient stringed instrument (probably the psaltery of the Old Testament), in which the sounds were produced by striking wires with hammers held in the hands. It was named from the sweetness (Lat. *dulcis* 'sweet') of its sounds.

Dul'cite, or **Dul'cose**, is a sweet crystalline substance contained in several plants, in *Melanopyrum nemorum*, *Scrophularia nodosa*, *Rhinanthus crista galli*, &c.

D. is isomeric with Mannite (q. v.), both of these bodies having the composition represented by the formula $C_6H_{14}O_6$. They are nearly related to the sugars and starches, as will be seen from the following formula :—



Dulse, or **Dill'isk**, the first name being the form now used in Scotland, the second the pure Gaelic, employed in Ireland (*Rhodymenia palmata*), denotes one of the red seaweeds very common on the British coasts and other parts of the northern hemisphere, and in the Grecian Archipelago It is eaten either raw, roasted between hot tongs, or with vinegar, by the poorer classes. At one time it was regularly sold about the streets, and in Edinburgh, a few years ago, no cry was more familiar than, 'Wha'll buy ma dulse and tang?' Sheep are fond of it, and in Kamschatka a kind of fermented liquor is made from it. In Iceland, where it forms an important article of food, it is sometimes boiled with milk. The name D. is also given in England to *Iridæa edulis*, while pepper-D. is *Laurentia pinnatifida*. Both are seaweeds, and are edible.

Dul'wich, a picturesque village of Surrey, 4½ miles S.S.E. of St Paul's, London, now practically within the bounds of the metropolis Pop. in 1871 of registration sub-district, 4041.

The College of God's Gift, or D. College, founded and endowed by Edward Alleyn in 1619, consisted originally of three sides of a quadrangle, but was considerably enlarged in 1869. Originally it maintained a headmaster, under-masters, chaplain, six poor brethren, six poor sisters, and twelve poor scholars. It is now an important educational institution for the children of parents residing on the manor, and has a revenue of about £12,000. In the picture gallery is a fine collection of old works.

Duman'gas, a prosperous town in the island of Panay, Philippines, province of Iloilo, has a pop. of 25,000. It exports exquisite piña fabrics, and has some fisheries of trepang (sea-slug) and tortoises.

Dumas', Alexandre Davy, one of the most popular French novelists, was born at Villers-Cotterets, in Picardy, July 24, 1803. His father, who bore the same name, was the son of the Marquis Davy de la Pailleterie by a negress, and D.'s negro descent showed itself strongly in his personal appearance, character, and even the style of his fictions. D. seems to have had a poor education, owing to the death of his father while he was a child, and little that is definite is known of him until in 1826 he is found in the household of the Duc d'Orleans. His first work was a volume of *Nouvelles*. The production, three years later, of an historic drama, *Henri III. et sa Cour*, pleasing the Parisian mania for Romanticism, made D.'s reputation. From that date onward he poured forth a prodigious number of dramas and fictions, all of which, though disfigured by a bombastic style and by egotism and licentiousness, were successful; nor was his popularity appreciably diminished when several writers, including M. Alphonse Karr and M. Eugène de Mirecourt, proved in 1844 and 1845 that a number of the works that bore his name were written by hacks in his pay. The best known of his countless works are perhaps his *Les Trois Mousquetaires* (8 vols. 1844), and *Le Comte de Monte-Cristo* (12 vols. 1841-45). The latter has gone through innumerable editions, and has probably been read by more people than any other work of the same class. D. lived a brilliant, restless, extravagant life. He began to write his own *Mémoires* in 1852, and died at Puys, near Dieppe, December 5, 1870. See his Life by Percy Fitzgerald (2 vols. Lond. 1873).—**Alexandre D.**, popularly known as *D. fils*, son of the preceding, was born at Paris, July 28, 1824, was educated at the Collége Bourbon, and at the age of seventeen published a volume of poems, *Les Péchés de Jeunesse*, which, however, had but a scant success, and D. became, like his father, a writer of dramas and novels, all of them dealing with the worst side of French life. His first essay in this direction, *La Dame aux Camélias* (2 vols. 1848), was interdicted when first produced, but the interdict was withdrawn in 1852. Among D.'s subsequent works are the dramas of *Visite de Noces* and *La Princesse Georges* (1871), and a pamphlet, *L'Homme Femme*, produced in 1872, and dramatised under the title *La Femme de Claude* in 1873, in which he attacks the French marriage system, *L'Etrangère* (1875), and *Entr'Actes* (1878). D. was installed as a member of the French Academy, February 11, 1875. As a writer of French fiction he has a reputation which appears grotesquely disproportionate to his genius and literary power.

Dumb. See DEAF AND DUMB.

Dumbar'ton (Gael. *Dun-Breatun*, 'the hill-fort of the Britons'), a seaport, and the capital of Dumbartonshire, on the left bank of the Leven, close to its junction with the Clyde. It is 15¾ miles W.N.W. of Glasgow, and 58 miles W. of Edinburgh. D. has extensive shipbuilding yards, marine-engine works, iron-forges, brass-foundries, and roperies. In 1874 a pier on the Clyde was constructed 768 feet long. Pop. (1871) 11,404. D. unites with Kilmarnock, Renfrew, Rutherglen, and Port-Glasgow in returning one member. At the confluence of the Leven and Clyde stands the famous rock of D., with its castle, one of the four stipulated to be kept in repair by the Articles of Union. The rock, which is of basalt, is 560 feet high, a mile in circuit at the base, and at high water is almost completely insulated. D. is, according to some, the Latin *Theodosia*, and was for a time capital of the British kingdom of Strathclyde.

Dumbartonshire, or the **Lennox**, a county in the W. of Scotland, consisting of two detached portions, the smaller of which is enclosed by Stirling and Lanark, and the larger bounded on the N. by Perth, on the E. by Loch Lomond and Stirling, on the S. by the Clyde, and on the W. by Loch Long and Argyle. Length, 35 miles; average breadth, 7½ miles; area, 270 sq. miles. The northern part is mountainous, Ben Voirlich being 3300 feet high; the southern part is in general low, and is fertile and well cultivated. D. has nine fresh-water lakes, the largest of which is Ben Lomond. The chief river is the Leven, which falls into the Clyde. The formation consists of mica-slate in the N., with dykes of whinstone and greenstone; Lower Silurian towards the S., and Old Red Sandstone along the Clyde estuary. The principal grain crop is oats, but barley and wheat are grown, and turnips and potatoes yield large crops. The hills and high grounds furnish pasture for black cattle and blackfaced sheep. In 1873 there were 45,207 acres in crop and grass, of which 10,454 were under corn crops, 4599 under green crop, and the remainder in grasses under rotation, or in permanent pasture. The chief industries are shipbuilding and machine-making at Dumbarton, bleaching and calico-printing in the Vale of the Leven; and there are besides iron-foundries, breweries, and tanneries. Coal, freestone, limestone, ironstone, and slates are produced. Pop. (1871) 58,857.

Dumdum', a town of British India, province of Bengal, in one of the twenty-four Pergunnahs, 8 miles N.E. of Calcutta. It has large cantonments, and is the headquarters of the Bengal Artillery. There is a cannon-foundry here, which has procured for D. the name of the Woolwich of India. Pop. (1872) 5179. At D. the Sepoys first openly resisted the use of greased cartridges (1857). The Valley of D. leads to the Pir Panjal, one of the passes into Cashmere.

Dumfries' (Gael. *Dun-Phris*, 'the fort of the bush'), the county-town of Dumfriesshire, and the chief place in the S. of Scotland, stands on a slight rising on the left bank of the Nith, 33 miles N.W. of Carlisle, and 70 S. of Glasgow by railway. It is a picturesque town, partly encircled by hills, is built mostly of dark freestone, and is clean, well lighted, and paved. Among the principal buildings are the Town Council Chamber, the Trades Hall, the County Courthouse, the County Buildings, the National Bank, and the D. and Maxwelltown Mechanics' Institute. Two bridges span the Nith, one of which was built in the 13th c. The chief manufactures are leather, hosiery, hats, and glue. The trade consists mainly in wool, freestone, wheat, oats, potatoes. By the high tides of the Solway vessels of over sixty tons can reach the quays. There are markets on Wednesdays and Fridays, and four large fairs during the year. Pop. (1871) 15,435. D. probably dates from the 8th c., and its possession was long contested between the Scottish and English kings. In the Minorite Convent at D. Bruce slew the Red Comyn in 1305. The town was plundered and burnt by the Highlanders in the Rebellion of 1745. Here Burns died in 1796. D. sends a member to Parliament, along with Annan, Sanquhar, Lochmaben, and Kirkcudbright. See Macdowall's *History of Dumfriesshire* (new ed. 1876).

Dumfries'shire, a county in the S. of Scotland, bounded S. by the Solway Firth and Cumberland, N. by Lanarkshire, Peeblesshire, Selkirkshire, and Roxburghshire, E. by Roxburghshire, and W. by Kirkcudbrightshire and Ayrshire. Area, 1129 sq. miles; pop. (1871) 74,808. The surface is diversified; there are high ranges on the N., W., and E., the chief peaks being Hartfell (3304), Lowther Hill (3130), and Black Larg (2890). The largest rivers are the Nith, Annan, and Esk, which divide the counties into the three districts Nithsdale, Annandale, and Eskdale. These rivers all rise in the N., and flow S. into the Solway. The geological formation is mainly Lower Silurian, with New Red Sandstone in the S. and carboniferous limestone in the S.E. The soil is fertile in the lowlands, and the high districts afford good pasture. In 1867 there were 50,134 acres under corn crops, 26,496 under green crops, 54,632 clover and grasses under rotation, and 89,575 grass not broken up in rotation. The principal minerals are coal and lead, and limestone and red sandstone are quarried. Sheep and cattle rearing is largely carried on, but the manufactures are not extensive, the chief being cotton-spinning, hosiery-making, tanning, and brewing. D. is traversed by the Caledonian and Glasgow and South-Western railways. The most important towns are Dumfries with its suburb Maxwelltown, Annan, Lockerbie, and Moffat.

Dummow', or **Dumoh**, a town of British India, Central Province, and capital of a district of the same name, 130 miles S.W. of Rewah. It is well supplied with water, and has an extensive bazaar. Pop. (1872) 7911.—The *district* or Pergunnah has an area of 2800 sq. miles, and a pop. (1872) of 283,625.

Du'mont, Pierre Étienne Louis, celebrated as the literary assistant of Mirabeau and the elucidator of Bentham, was born at Geneva, July 18, 1759. He was trained for the ministry of the French Protestant Church, and officiated both in Geneva and in St Petersburg. The tenor of his life was changed by his coming to England, first as reader to Colonel Barré, and next as librarian and tutor in the house of Lord Shelburne, afterwards Marquis of Lansdowne. This brought him the acquaintance of the leading English Whigs, Fox, Sheridan, and particularly of Sir Samuel Romilly. The outbreak of the French Revolution took D. to Paris, where he became the friend of Mirabeau, whom he aided in the preparation of his political writings and speeches. In 1791, on his return to England, he came in contact with Bentham, and adopted enthusiastically that philosopher's views of legislation. Bentham gave D. his manuscripts, and the latter, by translating his ideas into lucid French, made Bentham known to the civilised world. The chief are *Traités de Législation Civile et Pénale* (Gen. 1802); *Théorie des Peines et des Récompenses* (Gen. 1810); *Tactique des Assemblées Législatives* (Gen. 1815); *Preuves Judiciaires* (Gen. 1823). D. returned to Geneva in 1814, where he became a member of the Representative Council, and tried to reduce Benthamism to practice. He died at Milan, September 29, 1829. In 1832 M. J. L. Duval published from D.'s MSS. *Souvenirs sur Mirabeau et sur les deux Premières Assemblées Législatives*, a book of considerable historical value. See Candolle's *Notice sur la Vie et les Écrits de M. D.* (1829).

Dumou'riez, Charles François, a French general, was born at Cambrai, 25th January 1739, entered the army at an early age, and first saw service in the Seven Years' War. After a few years of restless wandering and varied employment, D. rose into favour at the time of the French Revolution, and attaching himself to the Jacobin Club, became first Minister of Foreign Affairs, and next general of the army against the Allies. His skilful military movements in 1792, when he won the victory of Jemapes, drove the invaders from the soil of France, saved the Republic, and made him the idol of Paris. He next overran and almost conquered the Netherlands, and would have been the first man in France had he not entered into negotiations with the enemy for the re-establishment of constitutional monarchy. The Convention denounced him as a traitor; his army refused to listen to his scheme; and he had to seek shelter in the Austrian lines. After this D.'s life was one of exile and pamphleteering. He died at Turville Park, Henley-upon-Thames, March 14, 1823. Wellington is said to have utilised some of his hints regarding an invasion of France. The *Mémoires du Général D.*, by himself, appeared at Hamburg in 1796, and *La Vie et les Mémoires du Général D.*, at Paris (1822-24). An admirable portrait of D. is given in Carlyle's *History of the French Revolution*.

Dun, a word found both in the Celtic and Teutonic family of languages, but probably belonging to the former, and signifying in both cases a hill or fort. It is often modified into *dum* and *don*, and appears in Dunedin (Edinburgh), Dunfermline, Dundee, Dunblane, Dumbarton, Dumfries, Dunstable, Dundalk, Donegal; probably also in London, Huntingdon. The same root appears in the Ger. *dünen*, Fr. *dunes*, Eng. *downs*.

Dü'na (Lithuanian, *Dangava*; Russ. 'W. Dvina'), one of the most important rivers in the W. of Russia, rises in the government of Tver, near the head-waters of the Volga, flows through a thickly-wooded country, first in a S.W. and then in a N.W. direction, and enters the Gulf of Riga, on the Baltic, after a course of some 650 miles. It receives the Lutschossa, Ulla, and Disna, and passes the towns Velij, Vitebsk, Poloczk, Disna, Dunaburg, and Riga, while its right bank is traversed by the Moscow and Riga Railway. The D. is navigable to ocean vessels only as far as Riga, where it is 2400 feet broad, but river craft ascend to Velij, a distance of 400 miles. Much timber is floated down the river. The Ulla is connected with the Dnieper by the Beresina Canal, thus linking together the Baltic and the Black Sea.

Dü'naburg, a fortified town in the government of Vitebsk, Russia, on the Duna, and 100 miles S.E. of Riga by railway. It has an arsenal, a strong fortress, and a *tête-de-pont*, which is considered a masterpiece. Its trade is growing. Pop. (1869) 29,462. D. was included in Livonia in 1277, and was destroyed by the Czar Ivan IV. in 1576. It finally became Russian in 1656. D. resisted an attack by Oudinot in 1812, but was taken by a combined French and Prussian force, under Macdonald, in the same year.

Dunbar', a seaport in Haddingtonshire, 29 miles E. by N. of Edinburgh, with which it is connected by railway. The old harbour being difficult of access from sunken rocks at its entrance, a new harbour, the Victoria, was constructed in 1844, which is well fitted for fishermen. There are valuable herring-fisheries here. D., with Haddington, North Berwick, Jedburgh, and Lauder, returns one member to Parliament. Pop. (1871) 3320. It is an ancient town, and grew up under the shelter of the castle of D., the chief seat of the Earls of D. and March, the ruins of which crown a rock near the harbour. The castle of D. played an important part in the War of Independence. It was taken by Edward I., and sheltered Edward II. after Bannockburn. In 1338 Black Agnes, Countess of D., defended it successfully for nineteen weeks against the Earl of Salisbury, in the absence of her husband. The battle of D., in which Cromwell defeated the Scots under Leslie, was fought September 3, 1650. Of this a graphic account is given in Carlyle's *Oliver Cromwell's Letters and Speeches*.

Dunbar, William, next to Burns the greatest Scottish poet, was born in Lothian, about 1460. He took the degree of M.A. at St Andrew's University in 1479, and having wandered as a Franciscan friar through England and Picardy, seems, after

1488, to have served as a clerk to foreign embassies, and in 1500 received an annual pension of £10. Henceforth he lived chiefly at court. In 1501 he visited England, and in 1503 celebrated the marriage of James IV. with Margaret Tudor in his poem of the *The Thrissill and the Rois.* A royal favourite, he obtained frequent gratuities in addition to his pension—which was raised to £80 a year—but sought a benefice, in numerous metrical petitions, in vain. After Flodden his name vanishes from the royal accounts, and he probably died about 1520. D. is a powerful and versatile writer. His works comprise picturesque elaborate allegories—such as the *Goldyn Targe* and *The Thrissill and the Rois*—and ludicrous and satirical pieces, full of a mad-cap, riotous humour, and a wealth of language reminding us of Rabelais. His imagination luxuriates in brilliant descriptions, or plays whimsical freaks with the most venerable and terrible themes. He paints with equal felicity the fresh beauties of a May morning and the grotesque horrors of a carnival of fiends. There is grim satiric earnestness in his *Dance of the Sevin Deidly Synnis,* deep pathos in his *Lament for the Makaris,* and an astonishing command of coarse vituperation in his *Flyting* with his friend and brother-poet, Walter Kennedy. He wrote also *The Fenyeit Freir of Tungland, The Twa Maryit Wemen and the Wedo, The Justis betuix the Tailyeouris and the Sowtaris, The Visitation of St Francis, Dunbar's Dream,* &c. See Laing's ed. of D. (Edinb. 1834).

Dunblane', a village, but formerly an episcopal city, in Perthshire, Scotland, on the Allan, 6 miles N.E. of Stirling, and a station on the Scottish Central Railway. Its old cathedral, said to have been founded by David I. in 1141, was rebuilt about 1240, and part of it is now used as the parish church. Leighton, Bishop of D. from 1661 till 1672, bequeathed his library to the clergy of the diocese. The building in which it is deposited bears the inscription 'Bibliotheca Leightoniana.' Pop. (1871) 1921. D. was anciently the seat of a Culdee convent.

Dun'can, Adam, Lord, Viscount of Camperdown, a famous British admiral, was born in Dundee, July 1, 1731. He entered the navy as midshipman in 1746, was promoted to a post-captaincy in 1761, distinguished himself greatly under Keppel in his attack upon Havana, and under Rodney off Cape St Vincent, became Rear-admiral of the Blue in 1789, and Vice-admiral of the Blue in 1793. In 1795 he was appointed to the command of the British fleet in the North Sea, and on October 17, 1797, won a brilliant victory over the Dutch fleet off Camperdown. D. received a pension of £2000 a year, the thanks of Parliament, and a sword of honour from the City of London, and was created Viscount D. of Camperdown. For a time he served against the Batavian Republic, and in 1799 obtained the rank of Admiral of the White. He died near Edinburgh, 4th August 1804.

Duncan, Thomas, a Scottish artist, was born at Kinclaven, Perthshire, May 24, 1807. He was a distinguished pupil of Sir William Allan at the Trustees' Academy, and succeeded him as its head. His industry and ability enabled him at an early age to attain the distinctions of R.S.A. and A.R.A., and the position of Professor of Colouring and Drawing in the Academy of Edinburgh, and he seemed to be entering on an exceptionally brilliant career when he was cut off by sudden illness at Edinburgh, May 25, 1845. D. had few rivals during his short but active life as a portrait and historical painter and a depicter of Scotch character, more especially its humorous side. Among his larger works may be noticed 'Prince Charles's Entry into Edinburgh after the Battle of Prestonpans,' exhibited in London; 'Mary Queen of Scots Signing her Abdication;' 'Martyrdom of John Brown of Priesthill, 1685;' and 'Wishart Dispensing the Sacrament on the Day of his Martyrdom, March 1, 1548.'

Dun'cansby Head (anc. *Berubium*), the N.E. headland of Scotland, in Caithness, 1½ miles E. of John o' Groat's House. It is a wild promontory, of Old Red Sandstone, about 100 feet high, worn by the sea into deep gullies (*ghoes*), and standing out into the Pentland Firth in caverned ledges. Duncansby Stacks are two insulated columns, the haunts of myriads of aquatic birds. Near D. H. is a small village, the ferry to the Orkneys.

Dundalk' (Irish Gael. *Dun-Dealgan*, 'the fort of Delga,' a Firbolg chief in the mythic history of Ireland), a seaport of Ireland, capital of the county of Louth, at the head of D. Bay, and at the mouth of the Castleton River, 50 miles N. of Dublin by railway. The port and harbour have been much improved in recent years, and steam-vessels ply regularly to Liverpool, exporting thence cattle, grain, butter, and eggs. In 1873, 1699 vessels, of 297,504 tons, entered and cleared the port. Pop. of parliamentary borough, returning one member, was, in 1871, 11,377. D. was the residence of Edward Bruce during his brief tenure of Northern Ireland (1315–18).—**D. Bay**, 8 miles broad, extends 7 miles inland, and is from 1 to 6 fathoms deep.

Dundas', a town in the province of Ontario, Dominion of Canada, on Burlington Bay, at the W. end of Lake Ontario, 40 miles S.W. of Toronto. It is situated at the head of the Desjardins Canal, on the Great Western Railway, has extensive mills and factories wrought by water-power, and a trade in agricultural produce. Pop. (1871) 3135.—A British island of the same name lies in the Pacific, off the coast of British Columbia, to the S.E. of Queen Charlotte Island, and has an area of 280 sq. miles.—**D. Strait**, in N. Australia, separates Melville Island and Coburg Peninsula, is the N. inlet of Van Diemen Gulf, and has a breadth of 20 miles.—**D. Castle**, the territorial residence of the D. family, is situated in Linlithgowshire, on the Forth, near S. Queensferry. The manor was a grant of the Earl of March, of date 1150.

Dundas of Arniston, the name of a Scotch family celebrated for the number of its members distinguished in the political and legal history of the country. Among the most eminent of the earlier of these are **Sir James D.**, governor of Berwick in the reign of James VI., from whom he received the honour of knighthood; **Sir James D.**, son of the preceding, who became a judge of the Court of Session in 1662, under the title—derived from the family estate—of Lord Arniston, but who lost his office because he refused to abjure the 'Solemn League and Covenant;' and **Robert D.**, grandson of the preceding (and son of Sir Robert D., who, like his father, obtained a seat on the bench), who was born December 9, 1685, rose to fill the posts of Solicitor-General and Lord Advocate, was returned for the county of Midlothian in the British Parliament in 1722, and in 1737 was raised to the bench under what may be considered the family title of Lord Arniston. Finally in 1748 he became Lord President. He died in 1753. His son, **Robert D.**, born 18th July 1713, also attained to the positions of Lord Advocate and Lord President (1760). His death took place at Edinburgh, 13th December 1787. The most notable member of the family, however, was **Henry D., Viscount Melville and Baron Dunira**, brother of the preceding. He was born in 1741, and educated for the Scotch bar, to which he was called in 1763. D. by his talents and industry won a high position, while, as a member of the General Assembly, he gave indications of that eloquence which subsequently gained him a position in Parliament. In 1774 D. was returned as member for the county of Edinburgh; in 1775 he was made Lord Advocate. His political career was more remarkable for brilliancy than for consistency. He managed to serve under Lord North, Lord Rockingham, and Lord Shelburne, and became finally the right-hand man of the second Pitt, under whom he held various offices, including those of President of the Board of Control, Treasurer of the Navy, and chief Home (or in reality War) Secretary. D. was a clever and industrious politician, if not a great statesman; and he will always be associated with the measures under the Pitt administration for enrolling volunteers to oppose a French descent, and for restoring the estates in Scotland forfeited on account of the rebellion of 1745. Under the Addington administration he was raised (in 1802) to the peerage as Viscount Melville and Baron Dunira. Four years later he was tried for 'malversation,' in his capacity of treasurer of the navy, but was finally acquitted. After this, however, he lived chiefly in retirement in Edinburgh, where he died, 27th May 1811.

Dundee' (Gael. *Dun-Diadhaidh*, 'sacred dune or hill,' Lat. *Taodunum*), a royal burgh and flourishing seaport in the S. of Forfarshire, situated on the N. side of the Firth of Tay, 50 miles N.N.E. of Edinburgh, and 20 E.N.E. of Perth by railway. It is the third largest town in Scotland, and the chief seat of its linen manufactures, being indeed 'the maker of the sacking, the bagging, and the wrapping of the world.' It lies pleasantly between D. Law (525 feet high) and Balgay Hill, and stretches

some three miles along the Tay, which has here a breadth of two miles. Its chief public buildings are the Albert Institute and Free Library, erected at a cost of £30,000; a Town-hall, in Roman Ionic, with a spire 140 feet high; the Royal Exchange, in the Flemish Pointed style of the 15th c.; the Kinnaird Hall, a massive Italian edifice, capable of accommodating 2000 persons; the Infirmary, in the Tudor style, forming three sides of a square; the High School, an elegant Grecian building; handsome court buildings; and the Morgan Hospital, for the education and upbringing of 100 boys, erected at a cost of £80,000 (1867–68). To the E. of the town is the Baxter Park, a splendid expanse of 37 acres, gifted to D. by the late Sir David Baxter; to the W. on Balgay Hill there is another public park, some 60 acres in extent, and ornamented with fine woods. In 1876 swimming baths were opened which cost £5500. The prosperity of D. is in great part owing to its magnificent docks, which have been constructed since 1851, at a cost of over £700,000. There are five wet docks, a graving dock, a large tidal harbour, besides extensive sea-walls and quays, a pier, and great shipbuilding yards. The chief industries are the manufacture of flax-yarns and linen fabrics (Osnaburgs, ducks, canvas, sheetings, &c.), silks, cottons, jute, cordage, iron, machinery, kid-gloves, confections (the famous D. marmalade), &c. D. has also establishments for shoemaking by machinery, breweries, and considerable shipbuilding. The linen industry employs over fifty steam spinning-mills, ten power-loom factories, besides numerous hand-labour works, and produces goods to the annual value of about £2,000,000. The value of the flax, hemp, and jute manufactures exceeds £5,500,000 yearly. D. imports directly the great bulk of the jute brought from India (113,930 tons in 1875), and, as a consequence of this industry, it has of late years become the centre of the seal and whale-fishing trade. The success of the latter fluctuates, but over a series of years the fishing is found a remunerative industry. The other imports are timber, coals, iron, lime, tar, &c. D. has regular steam communication with London, Newcastle, Liverpool, Stockton, Glasgow, &c., and is easily accessible by railway. A few miles to the W. of D., one of the largest iron bridges in the world is in course of construction (to be completed in 1877) across the Tay. It is to consist of ninety spans, several of which will be 245 feet long, and 88 feet above the level of high-water. Its cost will exceed £300,000, a sum entirely subscribed by the North British Railway and the bridge shareholders. The town returns two members to Parliament. Pop. (1876) 139,125. D. was formerly walled, and was twice in great part burned by Edward I. (1296 and 1303). It shared a like fate at the hands of the Duke of Lancaster in 1385. In the 16th c. D. was the first Scottish town to renounce Popery, chiefly through the influence of James Haliburton. It was pillaged by Montrose in 1645, and by General Monk in 1651.

Dundon'ald, Thomas Cochrane, Earl of, and one of the greatest of British sailors, was born at Culross, Perthshire, December 14, 1775. At the age of seventeen he entered the navy, taking service under his uncle, Sir Alexander Cochrane, and his services as commander of the little sloop *Speedy*, particularly in the daring exploit of capturing the Spanish frigate *El Gamo* off Barcelona, gained him a post-captaincy in 1801. As commander first of the *Pallas*, and subsequently of *L'Impérieuse*, D. did great damage to Spanish commerce, and distinguished himself in European and in African waters by successful actions against the French. For leading five ships against a French fleet in the Basque Roads in 1809 he was made a Knight of the Bath, but having offended the ministry by bringing Lord Gambier, his superior officer, to a court-martial for incompetency, he was not allowed further naval service. In 1814, on the charge of originating, for stock-exchange swindling, a false rumour that Napoleon had abdicated, he was expelled from Parliament, in which he had sat since 1807 as the Radical member for Westminster, deprived of all his honours, fined £1000, and ordered to stand in the pillory. The last part of the sentence was not enforced; his constituents, who believed in his innocence, which has since been established, paid his fine, and afterwards re-elected him. From 1818 to 1828 his exploits at sea greatly furthered the national independence of Chili, Brazil, and Greece. In 1830, on the advent to power of Earl Grey's administration, D. returned to England, and was reinstated in all his honours, became commander on the N. American and W. Indian stations, and rose to the rank of Rear-admiral of the United Kingdom. He succeeded to the Earldom in 1831, and gave up his later years to naval improvements, to the invention of 'infernal machines' for the wholesale destruction of an enemy, and to writing the story of his life, which appeared in 1859 under the title of *The Autobiography of a Seaman*. He died October 31, 1860, and was interred in Westminster Abbey. Among D.'s other works are *Observations on Rural Affairs* (1847), and *Narrative of Services in the Liberation of Chili, Peru, and Brazil* (2 vols. 1858).

Dundrum Bay (Irish Gael. *Dundroma*, 'the fort on the ridge'), an inlet of the Irish Sea, County Down, 5 miles S. of Downpatrick, 10 miles wide at its mouth, and stretching 3 miles inland. The *Great Britain* was stranded here in 1846.

Dune'din, the capital of the province of Otago, New Zealand, is picturesquely situated at the head of Otago Harbour, an arm of the S. Pacific 14 miles long, and at the base and on the slopes of hills. D. was founded in 1848, and until 1861 was a small and unimportant place. The discovery of rich gold-deposits at Gabriel's Gully in that year caused a great influx of population, and D. rapidly rose to the position, which it still holds, of being the foremost commercial town in New Zealand. In spite of numerous natural difficulties it is well laid out, containing about ninety streets, each 66 feet broad, and for the most part paved and lighted with gas. It is also well supplied with water from a reservoir. D. is a see of the Anglican and Roman Catholic Churches. It contains a number of fine public and private buildings, and possesses a rising university. Four daily, five weekly, and two monthly newspapers are published in D. The pop. of the municipality at the census of 1874 was 18,500; with the suburbs, 26,000. The trade statistics of D. for the twelve months from 1st October 1873 to 30th September 1874 show the imports to have amounted to £2,628,071, and the exports to £1,740,650. The two principal items composing the latter were 15,797,779 lbs. of wool, of the value of £959,451; and 141,564 oz. of gold, valued at £568,954. There were also exported £86,733 worth of wheat, and £55,074 worth of preserved meats.

Dunes, the name given to the sandhills which occur along the seaboard of the Netherlands as far as the frontier of France. They have been produced by the action, through an indefinite period of time, of strong winds from the German Ocean, and they serve as a natural barrier to protect the country from the destructive encroachments of the sea. In certain places they are covered with grass or heath, and pine-trees have been planted here and there. Though not available even for pasturage, they are yet invaluable as bulwarks of the rich lowlands of the interior. They occasionally attain so great an elevation as to hide the view of the sea from the steeples of the towns.

Dunferm'line (Gael. *Dun-Pharlain*, 'the fort of *Pharlain* or *Farlane*,' the legendary founder of the city), a royal burgh of Scotland, in the W. of Fifeshire 3 miles N. of the Firth of Forth, and 13 W.N.W. of Edinburgh, and a station on the Stirling and D. Railway. It has many handsome modern structures. On October 12, 1876, the foundation-stone of new municipal buildings was laid. D. is noted for its damask linen-weaving; other industries are flax-spinning, bleaching, iron-founding, brewing, &c., and in the vicinity are large coal-mines. Along with Stirling, Inverkeithing, Queensferry, and Culross, D. sends one member to Parliament. Pop. (1871) 14,963. D. was already a place of some importance in the 11th c. Malcolm Canmore and his queen Margaret founded a Benedictine Abbey here, 1070–93. The refectory, an arched gateway, and a tower still remain, but the rare old choir (1250) gave place to the present parish church in 1818–21. The latter building has a square tower 100 feet high, round the turret of which runs the inscription 'King Robert the Bruce' in open stonework. Edward I. passed the winter of 1303–4 at D., which was made a royal burgh by James VI. in 1588. D. was the birthplace of David II., James I. of Scotland, and Charles I., and its abbey is the resting-place of Malcolm Canmore, St Margaret, Edgar, Alexander I., David I., Malcolm the Maiden, Alexander III., Robert Bruce, his queen Elizabeth and nephew Randolf, Annabella, queen of Robert III., and Robert Duke of Albany, governor of Scotland. The skeleton of Robert the Bruce was disinterred and a cast taken of the royal cranium in 1821. See Dr Henderson's *Annals of D.* (Glasg. 1878).

Dung, the excrement of animals, and the most necessary of all articles in fertilising a farm. Restricting the word to its

ordinary sense, horse, cow, sheep, pig, and pigeons' D., the preference for securing growth may be given to the last, if applied to barley or wheat, but its limited production makes it of little account in ordinary farm-management, although doubtless it is quite equal in plant-nutritiveness to that of the birds which left guano deposits in Peru. Horse-D. is much appreciated, and, mixed with cow and sheep D., makes an excellent manure. All artificial substances are inferior, everything considered, to that which is made in the stable, byre, or shed; and the only regret farmers have is that they cannot obtain a sufficient quantity of it. The quality of D. purchased from towns or made on the homestead is not preserved as well as it ought to be. It should not be exposed to sun and wind, which rob it of its virtue, but should be put up in heaps, mixed with earth, as then its savour and fructifying powers are preserved for months. Some farmers are of opinion that D. is best made in covered courts, and carried direct from thence to the fields. Dunghills should be frequently turned, and not placed in proximity to drains, as the liquid percolates through the earth downwards, and tends to choke the drain. See Stephen's *Book of the Farm*; Gent's *Systema Agriculturæ* (published 1669); Mechi's *Profitable Farming*; Kames's *Gentleman Farmer*; and Hoskin's *Chronicles of a Clay Farm*.

Dungann'on (Irish Gael. *Dun-Geanainn*, 'Geanan's fort'), a town in the county of Tyrone, Ireland, 11 miles N.W. of Armagh, with manufactures of linen, coarse pottery, fire-brick, and tiles, and having in the neighbourhood the largest lime-quarries and collieries in Ulster. In 1876 a new Roman Catholic church was erected capable of holding 4000 people. D. returns one member to Parliament. Pop. (1871) 3886.

Dungar'van (Irish Gael. *Dun-Garbhain*, 'Garvan's fortress'), a seaport in the county of Waterford, Ireland, 40 miles E.N.E. of Cork. Pop. (1871) 7719. The inhabitants are chiefly engaged in the hake and herring fisheries, and fish, grain, butter, and cattle are exported. D. returns one member to Parliament. It is a favourite sea-bathing resort in summer.

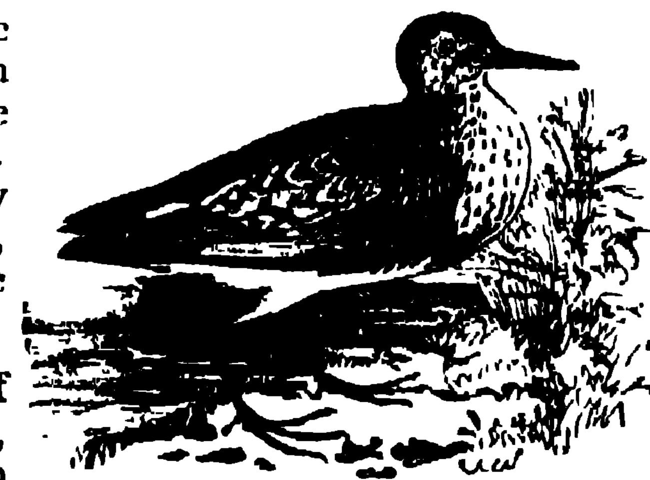
Dung-Beetle, a name given to several species of *Coleoptera* or beetles, belonging to the division of the Lamellicornes, distinguished by its members having the antennæ terminated by a club, formed of several flat leaf-like appendages. The popular name of these beetles has been derived from their habit of depositing their eggs amongst manure, whilst a few feed upon decaying matters of like kind. The family *Geotrupidæ*, for example, includes a familiar example of D.-B., the *Geotrupes stercorarius*, 'dor' or 'shard-borne' beetle, sometimes also named the 'watchman' beetle. This species attains a length of about an inch. It is of black colour, and infests fields for the purpose of depositing its eggs amid cow-dung. Nearly allied is the famous *Scarabæus sacer*, or sacred beetle of the Egyptians, which also deposits its eggs in manure. A North American species of D.-B. (*Gymnopleurus pilularius*) appears to roll the pellets of manure to the place where they are to be buried in the ground.

Dun'geon. See DONJON.

Dunkeld' (Gael. *Dun-Chailliam*; in the Pictish Chronicle *Duncalden*, possibly 'hazel hill'), a village and burgh of barony, formerly a city, in Perthshire, on the left bank of the Tay, 15 miles N.N.W. of Perth, and situated amidst the most romantic scenery. Pop. (1871) 783. The ancient cathedral, 120 feet long by 60 broad, built about 1230, is now included within the grounds of the Duke of Athole, which contain 20 sq. miles of larch-wood, together with the first larches planted in Britain. These were brought from the Tyrol in 1737, and at first treated as greenhouse plants. D. was a bishop's see from 1127 to 1688, but its ancient abbey, whose Culdees composed the cathedral chapter, was famous in the ecclesiastical annals of the kingdom at a much earlier date, and may perhaps date from the time of Kenneth MacAlpin. See Skene's *Celtic Scotland*, vol. i. (1876).

Dunkirk' (Fr. *Dunkerque*, 'the kirk of the dunes or downs'), a seaport in the department of Nord, France, on the Strait of Dover, 152 miles N. of Paris, with which it is connected by railway. It is a fortified town of the third rank, and has a tribunal of the first instance, a government navigation school, a communal college, a public library, and picture gallery. Its principal squares are the Champ de Mars, and the Place Jean Bart, in which there is a statue of the naval hero, erected in 1806. The most notable buildings are the town-hall (1644), the Gothic church of St Eloi (1560), with a tower 280 feet high, and a fine peal of bells (since 1853), the barracks for 2000 men, an exchange, a military hospital, and a theatre. D. is the entrepôt of the N., a railway centre, and the key to an extensive system of canals. It has regular steamboat communication with London, Hull, Rotterdam, St Petersburg, &c. Its manufactures are chiefly sailcloth, fishing-nets, leather, soap, sugar, spirits, &c.; there are also valuable cod, herring, and oyster fisheries. The imports include all kinds of colonial produce. Although far from picturesque, D. annually attracts many visitors for sea-bathing. Pop. (1872) 34,350. D. was founded near the church of St Eloi by Count Baldwin of Flanders, 960, but was burned by the English in 1388. About 1400 it was fortified, and it long continued an object of contention between France, Spain, and England. In 1540 it was taken from the Spaniards by the English, in 1558 captured by the French, and in terms of peace restored to Spain. It was seized by the great Condé in 1646, but was again regained by the Spaniards. In 1658 Turenne captured D., which, according to treaty with Cromwell, was made over to England; four years later Charles II. sold it to Louis XIV. for five million livres. After the Peace of Utrecht (1713), the fortifications were razed and the harbour filled up, but their restoration was allowed by the Peace of Paris, 1783. The allies besieged D. in 1793, but were forced to retire.

Dun'lin, or **Purre** (*Tringa cinclus*), a species of *Tringinæ* (or sub-family, including the sandpipers and other allies) found in Britain and other parts of Europe in winter, but more commonly on the eastern coasts of N. America. The average length is 8 or 9 inches. The plumage varies greatly with the seasons of the year, but brown hues predominate generally.


Dunlin.

Dun'mow and Flitch of Bacon. D., Great and Little, are two villages of Essex, 9 miles E. of Bishop Stortford by railway, and 35 miles N.N.E. of London. Of Great D. the pop. in 1871 was 2983; of Little D., 2 miles E. of the larger village, the pop. was 359. A richly-endowed priory, founded in 1104 by Lady Juga, sister of Ralph Baynard, formerly existed at Little D., and here the ancient custom of the D. Flitch had its origin during the reign of Henry III. This custom consists in presenting a F. of B. to 'whatever married couple will go to the priory, and kneeling on two sharp-pointed stones, will swear that they have not quarrelled nor repented of their marriage within a year and a day after its celebration.' From the chartulary of the monastery, now in the British Museum, it is proved that the bacon was claimed and won three times before the dissolution of religious houses. It was last awarded legitimately at the Priory Church in 1751. Since that time the custom remained in abeyance till 1851, when it was revived at Great D. The last presentation of the flitch took place 17th July 1876, by consent of a jury of six maidens and six bachelors. These interesting revivals of a commendable custom have taken place under the superintendence of Mr J. W. Savill of D., to whom all 'claims' on the part of constant and even-tempered couples are sent.

Dunn'et Head (Gael. *Dun-Nivet*, 'the fort of the bright or open place'?), the most northerly point of Scotland in Caithness, 13 miles W. by N. of Duncansby Head, lat. 58° 40′ N., long. 3° 21′ W. It is of Devonian formation, much corrugated; has a height of from 100 to 600 feet, and supports a lighthouse.

Dunnott'ar Castle (Gael. *Dun-Oitir*, 'the fort of the low promontory'), on the coast of Kincardineshire, 73½ miles N.E. of Perth, and 1½ miles S. by E. of Stonehaven, on a rock 160 feet above the sea. It was once the seat of the Earls Marischal of Scotland, but is now a ruin. After a six months' siege it capitulated to Cromwell's troops in 1651. Many of the Covenanters were imprisoned in D. C. during the troubled times of Charles II. and James II.

Dunois, Jean, Comte de Dunois et Longueville, popularly known as the Bastard of Orleans, was the illegitimate son of Louis Duke of Orleans, the brother of Charles VI., and was born about 1403. Aided by the great enthusiasm which Jeanne d'Arc had kindled in France, he drove back the English from Orleans and won the battle of Patay in 1429. After the death of the Maid of Orleans, D. carried on with uninterrupted success the war for French freedom, driving the English from all their conquests except Calais, and at the last even from Normandy and Guienne. He became the idol of France, was popularly styled *Le Libérateur de la France*, and deserved the admiration he inspired. Charles VII. made him his Grand Chamberlain. Louis XI., on ascending the throne, showed his dislike to D., as to the other favourites of his predecessor, by depriving him of his offices and honours. D., greatly incensed, joined the confederation of discontented nobles known as *La Ligue du Bien Public*, which brought the king to his senses and led to the Peace of Conflans (1465). By it D. was restored to his honours and posts. He died November 24, 1468. D. had a reputation for gallantry, and in the *Mémoires Secrètes de la Cour de Charles VII.* is described as the lover of Queen Marie of Anjou. He was twice married. His first wife was the daughter of the President Lanret, and his second Marie d'Harcourt, daughter of the Comte de Montgomery. From this second marriage is descended the French family of Longueville.

Dunoon', a favourite sea-bathing village in Argyleshire, on the Firth of Clyde, 25 miles N. by W. of Glasgow. Pop. (1871) 3756. Numerous well-built villas extend along the shore both N. and S. of D., and the ruins of an ancient castle, formerly a residence of the Argyle family, crown a green conical knoll near the pier. New burgh buildings were erected in 1874. The name may be *Dun-Nodha*, 'the new fort,' or *Dun-Aonhean*, 'the fort of guests,' or more probably *Dun-Omhain*, 'the fort of foam.'

Dunse (perhaps Gael. *Dun-sith*, changed into *Dun se*, 'fairy hill' or 'hill of peace'), a burgh of barony and market-town, Berwickshire, Scotland, 35 miles S.E. of Edinburgh, on the Whitadder, at the foot of D. Law, which is 630 feet high, and on the summit of which are traces of the camp formed by General Leslie and the Covenanters in 1639. The town is well built, and had in 1871 a pop. of 2618. D. is the birthplace of Boston (q. v.), author of the *Fourfold State*.

Dunsinn'ane, a sub-range of the Sidlaw Hills, about 7 miles N.E. of Perth, crowned with a hill-fort of concentric ramparts. It overlooks a vast district, including Birnam Hill (q. v.).

Duns Scotus, John, one of the greatest of the schoolmen, was born about 1265, most probably at Dunse in Berwickshire, though some assert Dunston in England, and others Down in Ireland, to have been his birthplace. When a boy, he entered the Franciscan institution in Newcastle, and afterwards studied at Oxford, where he distinguished himself by knowledge of logic, law, mathematics, and scholastic theology, and where, in 1301, he was made theological professor. His lectures were listened to by crowds, there being then, we are told, 30,000 students at Oxford. In 1304 he removed to Paris, and amazed his hearers by his dialectic subtlety, which earned for him the title of the 'Subtle Doctor.' He was appointed Professor of Theology in Paris, and taught with brilliant success until 1308, when he visited Cologne, being commissioned by his order to oppose the Beguines, and found a university there. He was received at Cologne with extraordinary enthusiasm, but shortly after his arrival was cut off by apoplexy, November 8, 1308. A legend clings to D. as to most of the great schoolmen. He is said to have been buried alive, and to have dashed out his brains against the coffin. D. holds a very important place in the history of mediæval thought. He gained an immense number of followers, known as *Scotists*, in opposition to the *Thomists*, or adherents of Thomas Aquinas, with whom D. was in utter antagonism in regard to divine grace, free-will, and especially the immaculate conception of the Virgin, a doctrine which he seems to have originated. (See NOMINALISTS and REALISTS.) His skill in starting new definitions and new themes for discussion was especially valued in an age when speculation was confined to a novel setting of orthodox doctrine. It has been said D. sometimes anticipates Spinoza, but in such cases he probably did not see whither his dialectic tended. From the opposition shown by his followers to the revival of letters, *Dunsman*, and hence *dunce*, came to mean one stupid or slow at learning. Most of D.'s voluminous works were edited, with Life, by L. Wadding (12 vols. Lyons, 1639).

Dun'stable ('the market-place of the hill'), a town in Bedfordshire, at the base of the D. chalk-downs. The principal industry is the manufacture of straw plait and bonnets. In winter, great numbers of larks are captured here for the London market. The parish church, on the restoration of which £10,000 had been expended in 1876, is part of the priory founded here by Henry I. A town-hall, plait-market, and corn exchange were erected in 1874. Pop. (1871) 4558.

Dun'stan, St, was born in 925 A.D., near Glastonbury, Somersetshire. His father, Heorstan, was a wealthy thane, and his uncles were bishops of Wells and Winchester. As a youth he was remarkable for learning and skill in painting, music, and metallurgy, and quickly became a favourite of King Æthelstan, but was driven by jealous enemies from the court. He then became a monk, but by no means an austere recluse. On the contrary, he studied literature and music, gathered many pupils about him, and won the affections of a rich lady, who placed her fortune at his disposal. About this time he is said to have had a grotesque adventure with Satan, whom, according to Robert of Gloucester, he seized by the nose with his red-hot tongs for peeping into his cell at Glastonbury. On the death of his rich patroness he returned to court, which envious intriguers again forced him to quit, but King Eadmund appointed him Abbot of Glastonbury, according to the *English Chronicle*, in 943. This would render his birth in 925 very dubious, as he could scarcely be an abbot when only eighteen. According to others, he was chosen abbot in 947. On Eadred's accession in 946, D. began to shine forth as a clear-sighted, adroit, unscrupulous statesman, advocating broad and conciliatory measures. He secured the alliance of the Scottish king against the Northumbrians by ceding the country between the Forth and Tweed, but Eadwig's succession in 955 interrupted his wise schemes of consolidation. Enraged by an insult which D. offered the queen, the new king stripped him of his offices, and forced him to seek safety in Flanders; whereupon Mercia and Northumbria proclaimed Eadgar king, and recalled D., who, after Eadwig's death in 958, was elected Archbishop of Canterbury, and during Eadgar's reign was virtually the secular as well as the ecclesiastical head of England. Instead of labouring blindly for the aggrandisement of Wessex, he endeavoured to consolidate the entire realm, and to pursue a truly national policy. Through his influence Northumbria was split into three parts, but their old rights were fully reserved to its Danish inhabitants. He enforced justice, promoted education, reformed the mint, and strove to restore purer morals among the laity and stricter discipline in the Church. Aided by the Bishops of York and Winchester, he laboured with fanatical energy to institute a celibate clergy, and expelled from the Church such priests and dignitaries as refused to separate from their wives. On Eadgar's death in 975, he procured the coronation of that king's son Eadward, and in a Witenagemot held shortly afterwards at Calne, in Wiltshire, is said to have confounded his enemies by a 'miracle.' The part of the floor on which his opponents were placed was made to give way suddenly, while D. and his party remained unhurt. But his influence fell on Eadward's assassination. The S. country proclaimed Æthelred king, the N. seceded, and D.'s long-cherished project of a united England was shivered for a time. In grief and defeat he retired to Canterbury, where he died in 988. D. possessed abundant and versatile talents, which he strenuously cultivated and applied. In Church questions he was narrow and intolerant, but as a statesman he was shrewd, liberal, and even patriotic. The ends which he inflexibly pursued were to unite England into a compact monarchy, to extend the influence of the English Church in civil affairs at home, while rendering it entirely plastic to the papal sway. D. wrote an adaptation of Benedict's *Rule of a Monastic Life*, and a *Commentary on the Benedictine Rule*. See Robert of Gloucester's *Life of D.*, *English Chronicle*, Mabillon's *Acta Sanctorum*, Kemble's *Saxons in England*, and Freeman's *History of the Norman Conquest of England*, vol. i.

Duode'cimal Scale (Lat. *duodecim*, 'twelve') is the division of unity into twelve parts, each of these again into twelve, and so on. Though it has the advantage of being divisible by 2, 3,

4, and 6, yet the decimal scale is now recognised as more convenient for our Notation (q. v.).

Duode'cimo (Lat. *duodecim*, 'twelve'), a term applied to a volume on account of the size of its page. A page D. is the 12th part of a page folio, the latter being the large sheet called a broadside once folded; just as a *quarto* is its 4th part, and an *octavo* its 8th. The well-known contractions for the three words are 4to, 8vo, 12mo.

Duode'num. The small intestine is divided into three parts: the first, 10 or 12 inches in length, immediately succeeding the stomach, is the D.; the upper two-fifths of the remainder is the *jejunum*, and the lower three-fifths the *ileum*. The D. is the shortest and widest part of the intestine. It describes in its course a curve somewhat like that of a horse-shoe, in the concavity of which we find the head of the pancreas.

Dupan'loup, Felix-Antoine-Philibert, a French churchman, was born at St Felix, Savoy, January 3, 1802. He studied theology at Paris, became a priest, and won notice as an excellent preacher and catechist. After refusing various charges in Paris, he was appointed Professor of Sacred Eloquence in the Sorbonne in 1841, and Bishop of Orleans in 1849. In 1848 he attended the deathbed of Talleyrand. In 1854 he was made a member of the Academy, and since 1850 he has taken part with considerable energy and keenness in politics, arguing for the rights of the Pope as a temporal sovereign against Edm. About. He was returned to the National Assembly in 1871, and voted with the Right. He died October 11, 1878. Among his most important works are *Manuel des Catechismes* (1838); *Des Associations Religieuses, De la Pacification Religieuse* (1845); *Souveraineté Temporelle du Pape* (1849); *Lettres sur l'Éducation Particulière* (1849); *Œuvres Oratoires* (1873).

Dupin', André Marie Jean Jacques, a French jurist and politician, was born 1st February 1783 at Varzy, in the department of Nièvre. Educated at Paris, D. took the Orleanist side in French politics, opposed in 1815 in the Chamber of Representatives the proposal to proclaim Napoleon's son as his successor, defended, along with Berryer, Marshal Ney, and subsequently acted as counsel for the English officers who aided the escape of Lavalette, for Béranger in 1821, and for the *Journal des Débats* in 1830. When Louis Philippe ascended the throne after the revolution of that year, D. was made Procureur-Général in the Court of Cassation. In 1832 he was elected President of the Chamber of Deputies, and held the office for eight years. The *coup d'état* of 1851, followed by the confiscation of the Orleans estates, caused D. to retire from public life, but in 1857 he resumed his former post in the Court of Cassation. His last public act was in 1865 to protest in the Senate against the growth of Parisian luxury. He died 10th November 1865. D. was the author of a number of valuable works, particularly on law. Among these are his treatise *Sur la Libre Défense des Accusés* (1815), which made his reputation as a Liberal advocate; *Précis Historique de Droit Romain* (1809); *Profession d'Avocat* (1830); *Manuel du Droit Public Ecclésiastique* (1845); *Règles Générales de Droit et de Morale tirées de l'Écriture Sainte* (1857). See *Mémoires de M. D.* (1855–60).—**François Pierre Charles, Baron D.,** a French geometer and statistician, the brother of the preceding, was born at Varzy, October 6, 1784, entered the navy as an engineer, and was much employed as such in France and the Ionian Islands. In 1814 he visited Great Britain, and examined its financial, commercial, industrial, naval, and military resources, the result being his *Voyages dans la Grande Bretagne* (Par. 1820–24), and *Force Commerciale de la Grande Bretagne* (1826). D. threw himself heartily into the work of teaching artisans science, established a *Conservatoire des Arts et Métiers* at Paris, and became its Professor of Geometry. In 1824 he obtained the honour of a barony. D., who through the revolutions of 1830 and 1848 had been a Liberal, was elected a senator after the *coup d'état* of 1851. He died January 1873. D. has published numerous works, chiefly on statistical, industrial, scientific, and educational subjects.

Dupin, Louis Ellies, a French historian, born of an old Norman family, at Paris, 17th June 1657. He studied at the Collége d'Harcourt, entered the Church, and was through life persecuted for his liberal opinions, being accused of treating the Virgin and the Fathers with disrespect. His favourite scheme was to unite the Roman Catholic, Greek, and English Churches. He died at Paris, June 6, 1719. Among his voluminous writings are *Nouvelle Bibliothèque des Auteurs Ecclésiastiques* (Par. 58 vols. 1686–1704); *Histoire des Juifs depuis Jesus Christ jusqu'à Présent* (Par. 1710); *Histoire Profane* (Par. 6 vols. 1714), &c. See Niceron's *Mémoires*.

Dup'licate Ra'tio. See PROPORTION.

Duplica'tion of the Cube, a celebrated problem of antiquity, also known as the 'Delian problem,' from the legend that when the island of Delos was being ravaged by a pestilence, the oracular response was that the pestilence would cease if the altar of Apollo were doubled, still retaining its cubical shape. Being a case of the solution of a cubic equation, it could not be solved merely with the aid of the circle and straight line. Hippocrates of Chios reduced it to the problem of inserting two mean proportionals between two given lines, which was solved by Archimedes, Eutocius, Pappus, Nicomedes, and others, by means of higher curves.

Dupon't, Jacques Charles, a representative French Liberal politician of the early part of the 19th c., was born 27th February 1767, at Neubourg in Normandy, and came into prominence in 1813, after the fall of Napoleon, when he acted as Vice-President of the Corps Législatif. Returned to the Chamber of Representatives for the department of Eure, and generally known as De l'Eure, D. continued a parliamentary Liberal in opposition till the revolution which drove Charles X. from the throne in 1830, when he was appointed to the Ministry of Justice, an office which he threw up in six months on account of what he considered the retrograde tendencies of the king. When the revolution of 1848 took place, D. again came to the front, being made President of the Provisional Government. In the Legislative Assembly, however, which succeeded the Constituent Assembly, D., whose opinions were too moderate, did not find a place. He died at his estate of Rougepierre in Normandy, 3d March 1855. By his friends he was titled *L'Aristide de la Tribune Française.*

Düpp'el, or **Dybb'öl,** a village of Slesvig, in the Sundevitt peninsula, opposite Sonderburg, noted in the Germano-Danish war for its entrenchments (*Duppeler Schanze*), built by the Danes, and taken by the Prussians after a month's fighting, April 18, 1864.

Dupuis, Charles François, the son of a village schoolmaster, was born at Trie-le-Château, 16th October 1742. He studied law and metaphysics at Lisieux, where he was also a Professor of Rhetoric. An enthusiasm for astronomy, derived from Lalande, suggested to him that the zodiac was a kind of national calendar for agriculture and other matters, and that the explanation of the varying religious myths was to be found in the constellations, interpreted by reference to the pursuits of each nation. His first publications brought him an invitation from Friedrich II. to Berlin. His chief work, *L'Origine de tous les Cultes, ou la Religion Universelle*, 10 vols. 8vo, with atlas, appeared in 1795. As a member of the National Convention, the Council of Five Hundred, and the Legislative body, he showed moderation, and a desire for liberty based on education. As a member of the Institute (in the departments of literature and fine arts, and history and ancient literature) he advocated the claims of the Pelasgi to be considered the universal parent stock—he considered them to have come from Ethiopia—and discussed the results of the commission to Egypt, which he had helped to arrange. D. died near Dijon, 29th September 1809. See *Notice Historique sur la Vie de D.*, by his widow (Par. 1813).

Dupuy'tren, Guillaume, a famous French surgeon and anatomist, was born at Pierre Buffière, 6th October 1777. In 1801 he became *Chef des Travaux Anatomiques* in the Collége de la Marche, Paris. Here he made important vivisections with reference to the functions of the sympathetic and to the consequences of tying the thoracic duct; and followed Bichat into pathological anatomy, his autopsis of cases of organic lesion numbering more than 1000. D. successively became assistant, head-surgeon, and Professor of Clinical Surgery at the Hôtel-Dieu. He was made a baron by Louis XVIII. Patronised by Charles X., he wished to rival the political career of Cuvier, but failed in his candidature for a seat in Parliament. He died 8th February 1835. D. excelled as a teacher in the class-room and in

the ward, and as a brilliant surgeon; he was without extensive or accurate scientific range, and has been detected in dishonest plagiarism and intentionally false reports of the success of his own operations. His most important memoirs are scattered through the *Journal* of Corvisart, the *Bulletin* of the Medical Faculty, the *Medical Library*, and *General Repertory of Anatomy.* See *Biographie de D.* (Par. Didot, 1855).

Duquesne', Abraham, Marquis, a famous French naval officer, born at Dieppe in 1610, first attracted public notice for gallantry in an engagement with the Spaniards off the Isles de Lerin in 1637, and afterwards successively at Corunna, Tarragona, Barcelona, &c. After the death of Richelieu, D. entered the service of Sweden, then at war with the Danes, defeated the Danish fleet (1643), was promoted to the rank of vice-admiral, but soon returned to the service of France, took part against the Frondeurs, and reduced Bordeaux. He was next engaged in chastising the Barbary pirates in the Western Mediterranean, destroyed the combined fleets of Spain and Holland under De Ruyter off the coast of Sicily in 1676, and was rewarded by Louis XIV. with the rank of Marquis. His last exploit was the successful bombardment of Genoa in 1684. D. was the only Protestant exempted from banishment on the revocation of the Edict of Nantes in 1685. He died in 1688.

Du'ra Ma'ter, a strong fibrous membrane which closely lines the interior of the skull, and forms a loose sheath in the spinal canal. The two other membranes protecting the brain are the Arachnoid and Pia Mater (q. v.).

Dura'men, or **Heart-Wood**, the innermost or oldest-formed wood in an exogenous stem. It is generally darker coloured. See STEM.

Durance', an impetuous river of France, rises in the Hautes-Alpes, near Mont Genèvre, flows S. through the Basses-Alpes, then W., forming the boundary-line between Vaucluse and Bouches-du-Rhone, and joins the Rhone between Avignon and Tarascon, 50 miles from the sea. It is 180 miles long, but owing to its rapid current no part of its course is navigable. Much timber is floated down from the upland forests. An aqueduct has been constructed from the D. to Marseille, 51 miles long.

Duran'go, or **Guadia'na**, the capital of a state of the same name, Mexico, is situated 6500 feet above the level of the sea. It has a handsome square, a cathedral, four monasteries, and a Jesuit college. The climate is healthy and cool, and there are rich mines of gold, silver, and iron in the vicinity. D. has a trade in horses, cattle, and leather. Pop. about 20,000. The state is traversed by the Sierra Madre. The surface is rocky and the soil poor, but there are valuable mines of gold, silver, and iron. Area, 42,510 sq. miles. Pop. (1873) 185,077.

Duraz'zo (the *Dyrrachium* of the Romans, whence D., as well as the *Dratsch* of the Turks and the *Durtz* of the Slavs), a fortified town and seaport of Albania, Turkey in Europe, on the Adriatic, exports grain, oil, and tobacco, and imports Manchester and Birmingham goods and colonial produce. Pop. (1871) 7000. D. is the Greek *Epidamnus*, which, from its favourable position on the Adriatic and fertile territory, soon became rich and powerful. The expulsion of the oligarchs ultimately led to the Peloponnesian War (q. v.). Dyrrachium did not occupy the exact site of Epidamnus, but a high and rocky peninsula near it, and received its name from the *ruggedness* of the situation.

Durbhan'gah, the capital of a district of the same name, province of Bengal, some 5 miles W. of the Gogari, a branch of the Ganges, and 62 miles N.E. of Patna. It is the residence of the Maharaja of D., who is perhaps the wealthiest zemindar in Bengal, having a rent-roll of £200,000. Pop. (1872) 147,450. —The *district*, which was formed out of the old collectorate of Tirhut, January 1875, is bordered on the S. by the Ganges, and produces much rice, barley, marua, opium, &c., and is celebrated for its tobacco and indigo. It was the centre of distress during the Behar famine of 1874. Area, 3334 sq. miles; pop. (1872) 2,197,324.

Dür'en (the *Marcodurum* of Tacitus, meaning 'the frontier-place on the river,' from *mark*, 'a frontier,' and *dur*, 'water'), a walled town on the Roer, Rhenish Prussia, 18 miles E. by N. of Aix-la-Chapelle. Pop. (1871) 12,862. D. has manufactures of woollen cloths, paper, leather, cast-iron and steel ware, and numerous distilleries of brandy. It was besieged by Charles V. in 1543.

Dür'er, Albrecht, a great German painter, was the son of a Hungarian goldsmith, and was born at Nurnberg, 21st May 1471. In 1486 he left his father's trade and became an apprentice of Wohlgemuth, the leading painter in Nurnberg. After his 'wanderjahre,' he executed as his masterpiece the drawing of Orpheus. He then made the unfortunate marriage with Agnes Frey which has been so touchingly described in Leopold Schefer's novel, *The Artist's Married Life* (Eng. transl., Chapman, 1848). His friends Hartman and Pirkheimer have told how unhappy this selfish woman made him. We have also the artist's journal of his travels in the Netherlands with his wife and the maid Susanna, and his letters to Pirkheimer, chiefly from Venice (published in *Relics of A. D.*, by Friedrich Campe, 1828), but these contain no complaint of his wife, whom he treated with great kindness. On his travels he was fêted by the Emperors Maximilian and Karl V., the King of Denmark, Margaret, Governess of the Netherlands, and by the painters of Bruges and Antwerp. When in Italy he met Raphael, with whom he exchanged portraits. Two portraits of D., painted by himself, still remain at the Florence and Munich galleries. He died broken-hearted, 6th April 1528. D. was a designer, painter, architect, sculptor, and engraver on wood as well as metal. Among his pictures may be mentioned 'Marius on the Ruins of Carthage;' the 'Martyrdom of St Bartholomew,' which the Emperor Rudolph placed in Prague; the 'Martyrdom of the Ten Thousand Saints,' which is at Vienna. Prague has also his 'Adam and Eve,' and Nurnberg has the 'Twelve Apostles.' He is considered to have thrown imaginative expression and fidelity to nature into the school of Van Eyck. Among his engravings proper may be mentioned the 'Knight and Death,' the 'Four Naked Women,' &c. D. is said to have been the first to use nitric acid. His cuts on wood and leather of the 'Passion of Jesus Christ' are well known through the cheap reprint issued by Smith & Elder; his 'Life of Mary' and 'St Eustatius Kneeling before a Stag' are perhaps the finest of the woodcuts. Among his portraits may be mentioned 'Erasmus,' 'Melancthon,' and his friend 'Pirkheimer.' D. also published works on *Human Proportion, Fortification*, and the *Use of the Compass and Square* (edition published at Arnheim, 1603). Wonderful stories are told of his manual precision. There is in his work a fantastic element strange to the modern eye. D. was a Protestant, and the finish and truthfulness of his works evince a deep, almost austere, religious feeling. See Lives of D. by Heller (1827), A. von Eye (2d ed. 1868), and W. B. Scott (1869); and *Le Peintre Graveur*, vol. iii., by Bartsch (Vienna, 1808).

Du'ress, in English law, is the plea of Compulsion (q. v.) by one who has failed in an obligation or who has committed a misdemeanour. If proved, the plea is effective. See also CRIME.

D'Ur'fey, Thomas, a writer of trifling anacreontics, &c., was born at Exeter about 1630. He was intended for the law, but took to play-writing, and became a favourite with Charles II., and a well-known author of songs, odes, and licentious comedies. Like Moore, he used to sing his own songs in his dinings out. He led a jovial, careless life, and died during the reign of George I., in 1723. His songs were collected under the title *Pills to Purge Melancholy.* He wrote a satire called *Butler's Ghost, or Hudibras, the Fourth Part.*

Dur'ham (Old Eng. *Dun-Holm*, 'the hill on the holm' or 'meadow,' an ancient episcopal city of England, and capital of the county of the same name, on the Wear, 13 miles S. of Newcastle, and 258 N.W. of London by railway. It is nearly encircled by the river, has the remains of old walls, and is mainly built on the steep sides of a hill, surmounted by an ancient cathedral and a castle. The banks of the Wear are now occupied by sloping gardens and beautiful public walks, and the river is spanned by three bridges (two of date 1120 and 1170 respectively), and by a railway viaduct of eleven arches. The majority of the houses have a quaint, picturesque appearance, in harmony with the natural beauty of the spot and with the grandeur of the cathedral. In a form nearly resembling a Latin cross, the cathedral comprises bold specimens of Norman and of the various English styles, covering an area of 53,700 feet, and having a nave 81 feet wide. Its length inside is 473 feet, and its chief feature

is three richly ornamented towers, the highest of which (216 feet) was built in the 13th c. The Chapel of the Nine Altars, at the E. end, is in pure and elegant Early English. In the same end there is an immense circular light of fine stained glass, while the interior pillars and the screen are festooned with rare carving. Cardinal Wolsey was for some time prelate of D., and the cathedral contains the tombs of St Cuthbert and Bede. The castle, which is in Romanesque, was founded by William the Conqueror about 1072, and contains a splendid dormitory. It was formerly the residence of the bishop, but is now appropriated to the University of D., incorporated in 1837, with power to grant degrees in (1) arts, classics, and mathematics; (2) in theology; and (3) in physical science. The University, which possesses a revenue of £3000 a year, has 6 professorships, and is attended by from 90 to 100 students. It has 12 fellowships and upwards of 20 scholarships. There are schools of physical science connected with it. Besides the cathedral, D. has six parish churches, also a county infirmary, public libraries, assembly-rooms, mechanics' institute, &c. The construction of a large reservoir was begun in 1876. The chief manufactures are woollens, carpets, paper, and iron and brass wares. Near D. are collieries and mineral springs. The town returns two members to Parliament. Pop. (1871) 14,406. About the year 995 Bishop Ealdhun brought hither from Chester-le-Street the remains of St. Cuthbert, and built for their reception a church or shrine, and thus finally fixed the seat of the old Bernician bishopric. The cathedral, however, was first begun by Bishop William de Carilepho about 1093, and was not completed till near the end of the 15th c. In 1290 the prior and convent of D. founded a college, which was abolished on the dissolution of monasteries (1539), revived by Cromwell during the Commonwealth, and again suppressed at the Restoration.

Durham, a county in the N.E. of England, bounded N. by Northumberland, E. by the German Ocean, S. by Yorkshire, and W. by Cumberland and Westmoreland, has an area of 973 sq. miles, and a pop. (1871) of 685,089. It lies between the Tyne and the Tees, and in the W. its surface is hilly and heathy, while it has a coast-line of 32 miles, chiefly consisting of magnesian limestone cliffs. The formation throughout is mainly millstone grit, coal measures, permian, and trias. D. is famous alike for its rich coal deposits and for its Teeswater breed of short-horned cattle. It is intersected by the river Wear, and has a good soil of dry loam and clay. In 1875 there were 95,198 acres in corn crops, 34,804 in green crops, 56,339 under clover, sanfoin, and grasses in rotation, and 202,249 of permanent pasture; also 17,200 horses, 63,125 cattle, 207,599 sheep, and 11,526 pigs. There are considerable dairy-farming and cattle-rearing. The chief industry, however, is coal-mining, there being over 240 collieries. Several of the pits reach to a depth of 100 fathoms, and extend horizontally for many miles. The other minerals are limestone, freestone, black marble, ironstone, slate, lead, &c.; and the manufactures include iron, chemicals, glass, pottery, and alkalies. There is also much iron-smelting and shipbuilding. D. is the capital, and the other towns are Sunderland, Gateshead, Hartlepool, S. Shields, Darlington, and Stockton. Four members are sent to Parliament by the county. D. was included (547–827) in the Anglian kingdom of Northumbria. It was endowed at a later period with palatine privileges vested in the bishop, having the power to hold parliaments, coin money, raise taxes, &c. These privileges, which D. enjoyed in common with the counties Chester and Lancaster, were resumed by the crown in 1836. D. possesses many British and Roman antiquities, and several fine castles and other remains. See *Registrum Palatinum Dunelmense*, vol. iii., edited by Sir T. D. Hardy (Master of the Rolls Series).

Durham, John George Lambton, Earl of, an English Liberal politician, was born April 12, 1792, at Lambton Hall, in the county of Durham, and the seat of his father, a gentleman of small estate but ancient family. He was educated at Eton, served for a short time in a hussar regiment, and was returned in 1813 for his native county. D. soon showed himself an advanced Liberal, opposed the Corn-Law Bill of 1815, the Alien Acts of the Castlereagh ministry in 1816, the measures to repress public meetings after the 'Manchester massacre' of 1819, and endeavoured to pass a scheme of parliamentary reform. In 1828 he was created Baron D. Two years later he became Lord Privy Seal in the Grey administration, aided in drawing up, and was almost the sole defender in the House of Lords of, the Reform Bill of 1832. Ill health compelled him to retire from the government, when he was made an earl, and in 1833 was sent on a special mission to Russia. During the insurrection in Canada of 1837–38, D. was sent out as Governor-General, but excited the ill-will of the Canadians, and was censured by the Home Parliament for transporting the leaders of the rebellion to Bermuda, and resigned the office. He died at Cowes, Isle of Wight, July 28, 1840.

Durham, Simeon of, an English chronicler of the 12th c., who taught at Oxford, and wrote Latin annals of England to the reign of Henry I. His book is specially valuable for the history of the N. of England, and was continued by John of Hexham.

Du'rian, or **Durion** (*Durio zibethinus*), a fruit-tree of the Malay Archipelago, belonging to the natural order *Sterculiaceæ*. Though it has a most offensive odour, it is one of the most delicious of fruits. 'A rich custard,' says Mr Alfred Wallace, 'highly flavoured with almonds, gives the best general idea of it.' The unripe durians are cooked as a potherb, the pulp is salted and preserved, and the seeds, as large as pigeon's eggs, are roasted and eaten like chestnuts. It is successfully cultivated in Ceylon and India, where it commands a high price. One tree will yield about 200 durians in a year.

Dürk'heim, one of the prettiest towns in the Rhenish Palatinate, Bavaria, on the Isenach, 10 miles N. of Neustadt by railway. It has a famous sausage-market (since 1494), and a considerable wine trade. Many visitors are attracted by the grape-cure, and by the neighbouring salt-baths of Philippshall. Pop. (1872) 5572. D., the old *Thurnigheim*, was the residence of the Frankish dukes of the Salian branch. It was rebuilt after the destruction of the castle of the counts of Leiningen by the Elector Palatine Friedrich in 1471, and again after its devastation by the French in 1689. About a mile S.W. of D. are the beautiful ruins of the Benedictine abbey of Limburg, founded by Konrad II. in 1030. Near the abbey, and on the summit of Kastanienberg, is the *Heidenmauer* ('heathens' wall'), a rampart supposed to be of Roman origin, and enclosing an area of 2 sq. miles.

Dur'lach, a town in the Grand Duchy of Baden, Germany, on the Pfinz, 3 miles E. of Karlsruhe by railway. It lies at the foot of a vine-covered hill (the Thurmberg), and is further linked to Carlsruhe by a canal and an avenue of poplars. Its manufactures are delf-ware, tobacco, beer, vinegar, &c., and it has a well-known fruit-market. Pop. (1872) 6327. D. was the capital of Baden before Karlsruhe was founded in 1715.

Du'roc, Géraud-Christophe-Michel, Duc de Friuli, was born at Pont-à-Mousson, October 25, 1772. He served as aide-de-camp to Bonaparte in the Italian and Egyptian campaigns. His services to the Consul in 1799 procured him a generalship, several important embassies, and the post of Grand Marshal of the Palace. He carried through the peace with Saxony (1806), the cession by Charles IV. of his rights to the throne of Spain, and the armistice of Znaim (1808). The scene between the Emperor and D. on the field of Markersdorf (where the latter was killed, May 22, 1813) is well known.

Durr'a, Dour'a, Durra Mill'et, or **In'dian Millet**. See SORGHO GRASS.

Dürr'enberg ('barren mount'), a village of Prussian Saxony, 6 miles S.S.E. of Merseburg, with important saltworks, established in 1763, which produced in 1871 22,150 tons of salt by evaporation. Pop. 267.

Dürr'enstein ('barren rock'), a village on the left bank of the Danube, Lower Austria, 44 miles W.N.W. of Vienna, with the ruins of the fortress in which Leopold Duke of Austria imprisoned Richard Cœur-de-Lion on his return from Palestine, 1191. Pop. 650.

Dur'sley (Welsh *dwr*, 'water,' and Old Eng. *ley*, 'meadow,' *i.e.*, 'the water-meadow,' from the Broadwell spring in the vicinity), a market-town in Gloucestershire, near the Coteswold Hills, 14 miles S. by W. of Gloucester, with fulling-mills and breweries. Pop. (1871) 2413.

Duruy, Victor, a French historian, born at Paris, September 11, 1811, for many years Professor of History at Rheims and

afterwards at the École Polytechnique, has especially devoted himself to historical geography. This subject he has treated in several works dealing with the Roman Republic and Empire (Par. 1838), the Middle Ages (1839), France to the year 1453. In 1863 he became Minister of Public Instruction under the Second Empire. His programmes and circulars excited much criticism among both Catholics and Liberals, and his *Histoire Contemporaine*, for use in the Lyceum, was written for the purpose of political propagandism. On his resignation in 1869 the grateful Emperor made him a Senator with a 'dotation' of 30,000 francs. D.'s chief works are *Géographie Historique du Moyen Age* (1839), *Géographie Historique de la France* (1840), *Histoire des Romains et des Peuples soumis à leur Domination* (1840-44), *Histoire Moderne* (1863), and *Introduction Générale à l'Histoire de France* (1865).

Dusic'yon, a genus of *Canidæ*, or Dogs (q. v.), inhabiting S. American flat-lands, and living gregariously in burrows in a wild state. They appear to be susceptible of domestication, and possess elongated bodies, sharp muzzles, and bushy tails.

Düss'eldorf, the capital of a district of the same name, in Rhenish Prussia, on the right bank of the Rhine, where it is joined by the Düsselbach, 21 miles N.N.W. of Cologne by railway. It is a handsome town, with wide regular streets, numerous squares, fine gardens, and promenades. Its main divisions are the Altstadt, on the right bank of the Dusselbach; the Neustadt, on the Rhine (built 1690–1716); the Karlstadt, on the left bank of the Dusselbach, founded by the Elector Karl Theodor in 1787; and the modern Friedrichstadt, forming the S. side. The principal buildings are the Collegiate Church, containing the tombs of the Dukes of Julich and Berg; the beautiful Church of St Andrea; the old electoral palace; the governor's palace; the town-hall (1567); the observatory; a public library of 50,000 vols.; and a new theatre (1875) capable of holding 1500 persons. The old castle of D., which was partly destroyed by the French in 1795, has been restored, and now contains the art academy and a collection of some 14,500 original drawings (by Lessing, Achenbach, Knaus, Schirmer, &c.), and 24,000 copperplate engravings. D. had formerly a splendid art gallery (founded in 1690, and removed to Munich in 1805), containing the most perfect collection of the works of Rubens and the other masters of the Flemish and Dutch schools. The celebrated art academy was established by Karl Theodor in 1767, was nurtured by Cornelius and Schadow, and has been under the care of Bendemann since 1859. D. is also one of the musical centres on the Lower Rhine. Its industries are rapidly increasing, and it enjoys every advantage of position, and complete communication by river and railway. Among the manufactures are cottons, colours, leather, tobacco, chemicals, carriages, and tapestry, and there is considerable trade in books and articles of virtu. Pop. (1871) 69,351. D. was a town as early as 1288, and was the residence of the Dukes of Jülich, Kleve, Berg. It was taken by the French in 1795, restored to Bavaria at the Peace of Luneville, 1801, and to the Duchy of Berg in 1806, along with which it came to Prussia in 1815.

Dust-Ball, a disease in horses, provoked by too much food composed of corn and barley-dust. The disorder affects chiefly the intestinal canal. Its presence is made known by a haggard countenance, a distressed eye, distended belly, and hurried respiration. The ball is sometimes about four inches in diameter, and as hard as iron.

Dust-Brand. See SMUT.

Dutch Gold is a very ductile and malleable alloy of copper and zinc, containing nearly 85 per cent. of the former. It can be beaten out into extremely thin leaves, resembling gold-leaf, for which it is a chief substitute. When triturated, it forms a 'bronze powder.'

Dutch Liquid was discovered in 1795 by the Dutch chemists Deiman, Paets van Trooskiyk, Bond, and Lauwerenburg. It is a componnd of olefiant gas or Ethylene (q. v.) with chlorine, having the composition represented by the formula $C_2H_4Cl_2$. D. L. is readily obtained by allowing chlorine and ethylene to come in contact. It is a colourless oily liquid, having a peculiar chloroform-like odour, and a sweet aromatic taste. It is heavier than water, and boils at 82·5° C.

Dutch Rush'es. See EQUISETACEÆ.

Du'tens, Louis, a French philologist and author, was born at Tours, 16th January 1730, of a Protestant family. At the age of eighteen he wrote a tragedy, *Le Retour d'Ulysse à Ithaque*, which was acted with success at Orleans. About 1750 he came to England, where he applied himself to Oriental languages and mathematics. While chaplain and secretary to Mackenzie, the English minister at Turin, he undertook a complete edition of Leibnitz, which appeared in 6 vols. in 1769. The latter part of his life was passed at Elsdon, Northumberland, where he had obtained a living. He belonged to the Académie des Inscriptions of Paris, the Royal Society of London, and was royal historiographer to George III. D. died 23d May 1812. His chief work, *Recherches sur l'Origine des Découvertes attribuées aux Modernes* (1766), appeared in 1766. Its learning is great and curious, but it had become D.'s craze that the ancients knew everything. He is more trustworthy as a numismatist, and published valuable dissertations on Greek and Phœnician medals and on precious stones.—**Joseph Michel D.**, nephew of the above, born at Tours, October 15, 1765, was an engineer and economist. He published, in 1804, an analysis of the fundamental principles of political economy, and in 1819, as the result of a government mission to England, his *Mémoires sur les Travaux Publics de l'Angleterre* (especially the canals). This was followed by his elaborate *Histoire de la Navigation Intérieure de la France* (2 vols. 1829). But his chief book is *Philosophie de l'Économie Politique* (1835). He died 6th August 1848.

Dutro'chet, René-Joachim-Henri, born 14th November 1776, at his father's country-house in Poitou. After serving in the royalist army of La Vendée, he adopted medicine as a profession, acted for a short time as military medical officer to Joseph Bonaparte, King of Spain, but latterly devoted himself to the study of physics and physiology. He entered the Académie des Sciences in 1831, and died at Paris, 4th February 1847. His specialty was the study of the movements of fluids in plants and animals, as connected with their growth, including, of course, the embryonic structure of plants, &c. He first used the terms *endosmosis* and *exosmosis*. His experiments on the results of artificially impressing motion upon growing seeds and plants are very curious. All his theories and discoveries are to be found in his *Mémoires pour servir à l'Histoire Anatomique et Physiologique des Végétaux et des Animaux* (2 vols. Par. 1837).

Dutt'eeah, or **Da'tia**, the capital of a protected state of the same name, Central India, in the agency of Bundelcund, 125 miles S.E. of Agra. It stands in a rocky district, is surrounded by walls, and has several massive buildings. Pop. 50,000. The native state of D., which is free of tribute, yields its rajah a revenue of £100,000, and has an army 6000 strong. Area, 850 sq. miles; pop. 120,000.

Du'ty. See ETHICS.

Duval', Alexandre Vincent Pineu, was born at Rennes, 6th April 1767. He was from 1792 to 1815 one of the leading dramatic authors in France in comedy, legitimate drama, and opera-comique. His works (ed. 1822-23, in 9 vols.) show skill in plot, effective dialogue, and comic situations. His most successful piece was *Édouard en Écosse, ou la Nuit d'un Proscrit*. He had a bitter controversy with Victor Hugo and the Romantic School, whom he accused of ruining the stage. He died at Paris, January 1842.

Duvau'cel, Alfred, a French savan, born in 1793, was the son-in-law of Cuvier, who instructed him in natural history. In 1817, as royal naturalist, D. undertook an expedition to Chundernagore, Sumatra, Malacca, and the valleys of the Ganges and the Brahmapootra. He made large collections, which were transmitted to Paris. He was a constant correspondent of the Asiatic Society of Paris. He describes his travels in a graphic style, without losing scientific precision. His visit to the King of Cossya and the 'Cavern of the Devil' is of especial interest. He died at Madras in August 1824.

Duy'se, Prudens Van, a Belgian author, born at Dendermonde, 28th September 1804, became Archivist of Ghent, and Professor of National History at the Athenæum, and died 13th November 1859. His *History of the Poetry of the Netherlands from the 15th c.*, and his own lyrical and dramatic pieces, contributed to the revival of Flemish literature.

Dwale. See BELLADONNA.

Dwarfs. See GIANTS AND DWARFS.

Dwell'ing-House. The legal theory in England and in Scotland is that a man's D.-H. is a sanctuary inviolable by legal execution, but there are so many exceptions to the rule that its force in law is not great. It gives no protection to one charged with a crime, nor against debt to the crown. In England the sheriff, in virtue of a writ called a Capias Utlagatum (see CAPIAS), may break into a D.-H., and seize the person against whom the writ is directed. In Scotland the same end is attained by letters of Caption (q. v.), in virtue of which the debtor is by legal fiction seized as a rebel.

By 24 and 25 Vict. c. 96, stealing anything from a D.-H., with menace to an inmate, is felony. (See BURGLARY.) It is sometimes a considerable aggravation of the offence or crime of assault, if committed within a D.-H. See BEATING AND WOUNDING, also for Scotland, HAMESUCKEN.

Dwight, Timothy, D.D, an American divine, was born at Northampton, Massachusetts, May 14, 1752. His father was Colonel Timothy D., and his mother was Mary, a daughter of Jonathan Edwards (q. v.). D. graduated at Yale College, 1769. After serving as chaplain in the revolutionary army, he was ordained over the Congregational Church, Greenfield, Connecticut, 1783, and in 1795 was elected President of Yale College and Professor of Theology. Here he powerfully opposed infidelity, and gave a fresh religious life to the college. His regular sermons formed the basis of his *Theology* (5 vols. Middletown, Conn. 1818), a work which has made his name a household word both in England and America. D. died January 11, 1817. Among his other works are *The Conquest of Canaan, an Epic Poem* (1785); and *Travels in New England and New York* (1821).

Dwi'na, or **Dzvina** ('the double river,' comp. Sansk. *Doab*), a river of Russia, and the largest navigable stream in the N. of Europe It is formed by the Suchona from Vologda in the W., and the Vitchegda from near the sources of the Petchora in the E., which unite below Ustug-Veliki, their joint stream then receiving the name D, and flowing N.W. to the White Sea. The Suchona, which is regarded as the head stream, rises to the N.E. of the Bielo Lake, and receives the Jug (250 miles) and the Luza before joining the Vitchegda, which has a previous course of 600 miles. It is thereafter increased by the waters of the Vaga (290 miles) on the left, and the Pinega (320 miles) on the right side. It has a total length of 1000 miles, and a basin of some 123,900 sq. miles. Near its mouth, at Archangel, it is 4 miles broad, and about 50 miles up it has a breadth of one mile, while it is navigable as far as the Suchona. Expanding into the D. Bay, it enters the sea through four deeply-furrowed courses. These again are enclosed by a bar, over which men-of-war can only pass at flood-tide. The D. is frozen from the middle of October to the end of April. The Jekatermen-Canal (1807) and the Alexander of Würtemberg Canal connect it with the Volga.

Dyak', Dayak, or **Djak**, the name of the aboriginal inhabitants of Borneo (q. v.), a people of Malaysian origin still numbering some 1,800,000. They are divided into five principal groups —(1) The wild nomad Mankettas of the interior; (2) the Pari or Kajan in the E.; (3) the Bijadshu in the S.; (4) the tribes of the N.W. in Sambas, Landak, Sarawak, &c.; and (5) those of N. and Central Borneo, chiefly in Brunai and the river district of Kapuas, to which belong the pirate tribes Seribas and Batangulpar. In appearance the D. is robust and muscular, of a complexion varying from the lightest to the deepest brown, with a round face and long black hair. The average height of the men is 5 feet 2 inches. Several of the coast tribes have embraced Mohammedanism, but there is gross superstition everywhere, while polygamy, and even, it is said, cannibalism, prevail. The Dyaks, who are yet but little-civilised, are chiefly engaged in cultivating rice, and in bartering gold-dust, diamonds, rattans, gutta-percha, &c., with the Chinese. They are slightly clad, and occupy wooden houses which are often large enough to accommodate 100 persons.

Dyce, Alexander, an English author and editor, was born at Edinburgh, June 30, 1798. Educated at the High School of that city and at Exeter College, Oxford, D. took orders, and for a time officiated as a curate; but in 1827 settled down to literary work in London. This work consists chiefly of editions, with notes and biographies, of the English dramatists who were predecessors or contemporaries of Shakespeare, such as Peele, Greene, Webster, Middleton, Beaumont and Fletcher, Marlowe, and Shirley; editions of the poems of Shakespeare, Pope, Beattie, and Akenside, for Pickering's *Aldine Poets*, with biographies of the poets; his discovery and publication of two old plays, *Timon* and *Sir Thomas More; Recollections of the Table-Talk of Samuel Rogers* (1856); and above all, his *Complete Edition of the Works of Shakespeare, the Text Revised, with Account of the Life, Plays, and Editions of Shakespeare, Notes, &c.*, (1853-58). D., who was also one of the founders of the Percy Society, for the publication of old English ballads, plays, and poems, died May 15, 1869.

Dyce, William, R.A., painter, was born at Aberdeen, in 1806, and after an education at Aberdeen University, studied art at Rome. His first work was exhibited at Edinburgh in 1827, and three or four years later he exhibited in the Royal Academy, London. His 'King Joash Shooting the Arrow of Deliverance' made him an Associate of the Royal Academy (1844), and he was appointed Professor of Painting in London University. D. was very successful as a fresco-painter, and was employed to decorate Buckingham Palace, Osborne House, the Palace of Westminster, and the House of Lords. His fresco 'The Baptism of Ethelbert,' in the last-named edifice, is much admired. Among his pictures are 'Christabel' (1855), 'The Good Shepherd' (1856), and 'The Man of Sorrows' (1860). D. was elected R.A. in 1848, and died at Streatham, February 14, 1864.

Dyck, Sir Anthony Van, who divides with Titian the foremost rank in portrait-painting, was born at Antwerp, March 22, 1599, commenced to study art under Van Balen at the age of ten, and at the age of fifteen entered the studio of Rubens. The genius that manifested itself thus early was rapid in development; and on the 11th February 1618, when still a youth of only nineteen, he was admitted a Master by the Guild of Painters at Antwerp. Two years afterwards Rubens engaged him as his assistant, and in 1621, his fame having already spread to England, James I. took him into his service. In 1623 we find him in Venice, painting portraits and studying Titian by making copies of his works. He afterwards visited Rome, where he won the patronage of Cardinal Bentivoglio, and afterwards he removed to Genoa. During his Italian tour he laboured with great assiduity, and as he painted rapidly, he produced an immense number of works, chiefly portraits. On the 4th July 1625 he landed at Marseille, visited Paris, and thence returned to Antwerp. There he remained from 1626 to 1632, during which period he produced his finest historical pictures and many of his noblest portraits. In the latter year he repaired to England, and entered the service of Charles I., who appointed him chief court-painter, with a salary of £200 a year, and soon after conferred on him the honour of knighthood. The English nobility following the example of the king, Van. D. soon found himself practically the portrait-painter for the aristocracy of England. But even when his income was princely, and his state and equipage often surpassed those of the lords who sat to him, he was haunted by ambition, and desired to devote himself to some great historical work. With this view he proposed to decorate the walls of the Banqueting Hall, Whitehall; but the king would not accede to his terms. D., who had married Mary Ruthven, grand-daughter of the Earl of Gowrie, died at Blackfriars, 9th December 1641. He was buried with great pomp in St Paul's. Inferior in power of colour and in dramatic instinct to Rubens, he surpassed him in the intensity and elevation with which he expressed emotion. Ease, refinement, and high chivalric sentiment are the chief characteristics of his portraits. Of his historical works the chief is the 'Crucifixion' (1627) in the cathedral at Mechlin. 'This picture,' says Reynolds, 'may be considered as one of the first pictures in the world.' His 'Sampson betrayed by Delilah,' in the Vienna Gallery, is considered by Waagen, as, in a dramatic sense, his finest work. His 'Virgin and Child Enthroned,' in the same gallery, is unsurpassed for elevation of feeling and Titianesque glow of colour. D.'s portraits are to be found in all great galleries, and many splendid specimens adorn the collections of famous English families. The grandest of all his family pictures is that of Johann Duke of Nassau, with his duchess and children, now at Panshanger. He painted a number of portraits of Charles I., one of the finest of which is in the Vienna Gallery.

The finest equestrian portrait painted by Van D. is that of Francesco de Monçada, Marquis of Aytona, in the Louvre. See Carpenter's admirable *Pictorial Notices*, &c. (Lond. 1848); *Lectures on Painting by the Royal Academicians*, with introductory essay and notes by R. Wornum, Esq. (Bohn's Scientific Library); *The German, Flemish, and Dutch Schools*, based on the *Handbook* of Kugler, remodelled by Dr Waagen, and revised by J. A. Crowe (Lond. Murray, 1874).

Dye'ing (Old Eng. *deag*, 'a dye or colour') is the art of imparting fixed and permanent colours to textile substances. The art of D. is one of great antiquity, and of vast extent and importance. The substances to which dyes are imparted are very numerous, and varied in their character and in their behaviour towards D. materials, and the dyes (see DYE-STUFFS) are in their turn equally numerous and different in their composition, properties, and tinctorial effect. There is abundant evidence that the art of D. has been practised from the most remote antiquity. The Jewish patriarch Jacob gave to his favourite son Joseph a coat of many colours, and from the Mosaic narrative we find that the art of D. had attained great perfection in Egypt during the period of the Israelitish sojourn in that land. The fame of ancient Phœnicia, and the supreme commercial position of its capital, Tyre, were largely due to the purple dye of that city. On account of its brilliancy, beauty, and costliness, cloth dyed in this colour became the badge of royalty, and to this day the phrase 'imperial purple' is still employed. The purple of Tyre was obtained from certain molluscs of the genus *Murex*, two different shell-fish, according to Pliny, distinguished as the *Buccinum* and the *Purpura*, being its source. It is supposed that the brilliant D. material, murexide, obtained from guano and other sources of uric acid, is identical with the Tyrian purple of the ancients. From very ancient times the population of Hindostan has occupied a foremost position in the knowledge of the art of imparting rich and permanent colours to textiles, and been famous for the skill and artistic effect with which they combined and harmonised their rich colours in woven and printed patterns; and not a little of the knowledge of D. enjoyed by Western nations at the present time has its source among Eastern peoples.

Any texture can only be said to be dyed when the colouring material is so incorporated with or attached to it that it is not affected by washing in hot water, and when it will bear a reasonable amount of exposure to light and moisture without sensibly bleaching or fading. The affinities of the various animal and vegetable substances for the colouring principle of dyes vary greatly. As a general rule it may be said that the animal fibres—silk and wool—take up colours much more readily, and assume more brilliant hues, than either linen or cotton. Silk and wool, moreover, are in many cases dyed permanent colours by preparations which, without the aid of mordants or chemical agents, only give a fleeting stain or discolourment to vegetable fibres. Most of the red colours derived from aniline, for example, attach themselves permanently to woollen textures on a simple immersion of the substance in the beck of prepared dye, no mordant being used. But in order to dye cotton with any of the aniline reds, the goods must first be prepared in a mordant, that generally used for dyeing magenta being the stannate of soda, tannin liquor, and alum. Such mordants are intermediate agents, which have at once an affinity for the fibre to be dyed and the D. material to be employed, and by the use of different mordants a variety of shades and effects are produced with the same D. material. Colouring matters become thus divisible into two classes—(1) Dyes which are fixed, and become permanent without the intervention of any mordant. These receive the name of *substantive* colours. (2) Dyes which require for their fixation the agency of a mordant, which class is known as *adjective* colours. A large proportion of dyes belong to the second class, and in many cases the brilliancy of substances of the first class (substantive colours) is greatly increased by the use of mordants.

Dyes are communicated to textile fabrics either by a process of mechanical fixation, or by a chemical combination between the fibre and the dye. Similarly the action of a certain class of mordants, which comprises salts of tin, iron, &c., is explained by a chemical combination between the mordant and the fibre on the one hand, and the colour and mordant on the other; and a second class of mordants act by mechanically glueing or fixing the colour to the fibre. The operations of D. may be generally summarised under the following heads:—(1) Dyes mechanically fixed. This class includes the dyes known as pigment colours, which are insoluble powders in a state of minute subdivision. They are fixed by means of albumen and similar substances, which, on the application of heat, become solid and insoluble, so that the dye and fibre are in a fashion glued to each other. (2) Dyes which unite directly with the fibre. In the case of such dyes a chemical attraction is set up between the dye and the fibre on the immersion of the fabric in the dye-bath, and the colouring matter is drawn to and permanently fixed on the texture. It is only animal fibres which can be thus dyed, and aniline reds, picric acid, and archil dyes on wools are examples of this style. (3) Dyes fixed to the fibre by means of a mordant. To this class allusion has already been made, and it embraces the most important and extensively-employed substances in the D. series. (4) Dyes fixed by oxidation, in which the dye is communicated to the fibre in a state of solution, and which, on exposure to the air, or by other means of oxidation, develop their colour and become permanently fixed on the fibre. Indigo blue forms the best example of this class, it being applied to the substance to be dyed as a colourless solution of white indigo (or indigo which has taken up a proportion of hydrogen into its composition), and which, on exposure to air, rapidly absorbs oxygen and again assumes its blue colour. These classes include the principal means by which dyes are united to fabrics, but there are others which cannot be referred to any of them, and which are due to a variety of special chemical or mechanical agencies. The operations of D., as carried on in manufacturing establishments, are so varied and complex that no general outline of the industry can be given.

In practice, certain preliminary operations are necessary for the preparation of textile materials for D. In order that any material may take up a uniform colour it must be in a state of chemical and mechanical uniformity. Cotton and linen fabrics go through a prolonged and tedious series of operations in Bleaching (q. v.), and similarly silk and woollen fabrics are 'scoured' to extract grease and incrusting substances. Wool and silk are very frequently dyed in the yarn before weaving, cotton is more generally operated on in the web, and linen is not very often submitted to the process of D. at all. A considerable quantity of cotton is dyed Turkey-red in the yarn, and other colours used in gingham-weaving must also of course be yarn-dyed. After D., goods are prepared for the market by washing, starching, and calendering or beetling in the case of woven cotton fabrics, and by a variety of processes in the case of silk and woollen textures, according to the nature of the cloth.

Dy'er, George, an English author, was born in London, 15th March 1755, educated at Christ's Hospital and Emmanuel College, Cambridge, and after 1792 settled in London as a writer. He died 2d March 1841. D. was a good scholar, and a most industrious and useful author. He took a large share in the production of Valpy's edition of the classics (141 vols.), and wrote the *History of the University of Cambridge* (Lond. 1814), *The Privileges of the University of Cambridge*, &c. (Lond. 1824), and numerous other works.

Dyer, John, an English poet, was born at Aberglasney, Carmarthenshire, in 1700, educated at Westminster School, gave up law for painting, travelled in Italy, finally settled in England, took orders, and became rector of Coningsby in Lincolnshire, where he died, July 24, 1758. He was a pleasing and natural poet. His works consist of *Grongar Hill* (1726), an excellent descriptive poem; *Ruins of Rome* (1740), a more ambitious and less successful effort; and *The Fleece*, a Georgic in praise of sheep-shearing and the wool trade. D. had considerable poetic power, which was recognised by Gray and Wordsworth.

Dye-Stuffs, the materials used by dyers for producing colours upon textiles and other substances. D.-S. which produce their tinctorial effect directly, without the intervention of any adjunct, are termed *substantive* dyes, while others which require a secondary agent or mordant are known as *adjective* colours. On this account a variety of substances which act as mordants ought to be included in the list of necessary D.-S., although of themselves they have no tinctorial virtues. The chief mordants used in dyeing are various salts of tin and iron, and to a less extent of other metals, aluminous compounds, sartrates, and tannic acid. D.-S. proper are very numerous;

they are drawn from the mineral, vegetable, and animal kingdoms, and an increasing number of the most important and valuable D.-S. are obtained by chemical reactions from various products of coal-tar. The chief D.-S. will be noticed under their proper headings, and here they are only briefly named and classified according to their various sources.

Animal Substances.—Carmine and other lakes, the most brilliant and valuable of all red dyes, are obtained from cochineal, the female insect of *Coccus cacti.* Kermes is a red dye produced from a closely allied insect, *Coccus infectorius.* Lac dye is an E. Indian product, extracted from a resinous exudation produced on various trees by another species of *Coccus.* Galls also are produced by the puncture of insects, chiefly of the genus *Cynips*, on various species of oak and other trees. The purple of Tyre was a product of the molluscan genus *Murex;* and the murexide dyes of modern times are prepared chiefly from guano.

Vegetable D.-S.—The vegetable kingdom is the source of by far the largest number of the tinctorial agents used in industrial processes. The most important and extensively used vegetable D.-S. is madder, the roots of *Rubia tinctoria*, widely cultivated throughout the S. of Europe. With various mordants, it yields many shades of red, purple, brown, and black, and it is the material employed for dyeing the well-known Turkey-red. It contains two chief colouring principles, alizarin and purpurin, which are now largely prepared from a product of coal-tar, this being the first instance of the artificial production of natural organic D.-S. Munjeet is the roots of a closely allied plant, *Rubia munjista*, grown in the E. Indies, and possessed of properties similar to madder. The wood of several trees yields red colouring matters, the chief of which are logwood, obtained from *Hæmatoxylon Campechianum;* Brazil wood, yielded by *Cæsalpinia Brasiliensis;* peach-wood, from *Cæsalpinia echinata;* and there are one or two other species of *Cæsalpinia*, all of which, with logwood, grow in the W. Indies and tropical America. From the E. Indies two red dye-woods are obtained, sappan wood from *Cæsalpinia sappan*, and red sanders, the wood of *Pterocarpus santalinus;* and camwood or barwood, the produce of *Baphia nitida*, is imported from the W. coast of Africa. Two varieties of wood yield yellow dyes of commerce: (1) Fustic, the wood of *Maclura tinctoria*, a tree growing in the W. Indies and Central America; and (2) Zante or young fustic, the wood of *Rhus cotinus*, found in Eastern Europe and Asia Minor, the leaves of which form the sumach used in dyeing and tanning. Among other vegetable D.-S., none is of greater importance than indigo, the well-known blue dye prepared from *Indigofera tinctoria* and *I. anil*, originally natives of the E. Indies, but now also cultivated in the W. Indies and tropical America. Closely allied to indigo in its properties is woad, a preparation from our native plant the weld or woad, *Isatis tinctoria*, which in remote times was used for staining the skins of our ancestors. Safflower, which yields a fine pink dye, is the flower-heads of a composite plant, *Carthamus tinctoria*, cultivated in the S. of Europe. Alkanet, a red dye-stuff, not now much used, is the roots of *Alkanna tinctoria.* A valuable series of purple dyes, known as archil, cudbear, and litmus, are yielded by various species of lichen, chiefly *Roccella tinctoria*, found wide-spread on the coasts of warm seas. Among materials yielding various shades of orange and yellow are quercitron, the bark of *Quercus tinctoria*, a N. American oak; yellow or Persian berries, the fruit of *Rhamnus tinctoria*, which grows in Asia Minor; annatto, a substance covering the seeds of *Bixa orallana*, the al or ak root, yielded by various species of *Morinda* in E. India, and saffron, which is the pistils of a variety of *Crocus*, a substance, however, more used in pharmacy than in dyeing. Catechu and various other substances containing tannin are used for browns and blacks in dyeing.

Mineral Pigments.—The most important of these for the use of the dyer is ultramarine, a rich blue colour which primarily was obtained from lapis-lazuli, but now is artificially prepared. Artificial ultramarine is a complex substance, varying in its constitution. (See ULTRAMARINE.) Prussian blue is obtained by mixing a solution of ferro-cyanide of potassium (prussiate of potash) with a solution of a salt of iron, such as the chloride. Other mineral blues are obtained from cobalt; greens are yielded by arsenical compounds; and preparations of chromium give both yellow and green pigments. Vermilion is to some extent used as a red pigment colour by dyers.

Artificial Organic Dye-Stuffs.—The whole of the colouring-matters we include in this group are derived from one or other of the numerous products obtained from the treatment of coal-tar, but chiefly from aniline. Although the industries connected with the production of aniline dyes may be said to be still in their infancy, they have already overshadowed all others connected with the production of D.-S. in extent and importance. All colours, and almost every shade of colour, have been produced in aniline colours, and a simple enumeration of the commercial varieties which have been brought into the market would occupy columns, while to detail the variety of processes employed would require many pages. Mauve, or Perkin's violet, was the first colour introduced, the process for obtaining which having been patented by Mr Perkin in 1856; but the subsequently discovered Hofmann red (magenta or rosaniline), while itself a much more important dye-stuff, is the starting-point for obtaining nearly all the endless aniline dyes now in use. Carbolic acid or phenol, naphthalin, and anthracin, all derivatives of coal-tar, are also sources of several important D.-S., the latter being the source of artificial alizarin, to which allusion has already been made.

Dyke, or **Dike** (Old Eng. *dic*, Dutch, *dyk;* lit. 'the earth dug out and thrown up'), in engineering, a mound or embankment to protect low-lying land from inundation by the sea or a river. In the Netherlands, where much of the land is below the sea-level, the art of D.-building has been carried to great perfection. The character that the Dutch bear for indefatigable industry has been due mainly to their extraordinary and successful efforts to prevent the encroachment of the sea, and reclaim the land through extensive systems of drainage by means of dykes and other engineering resources. Dykes may be seen along the coast of Holland and the courses of the principal rivers, especially at the mouths of the Scheldt, Maas, and Rhine. They also traverse the country in every direction, being of sufficient width at the summit to carry canals and roadways alongside. These mounds are formed of clay, earth, and sand, and slope gradually from the base. On the sea or river side the gradients are easy, and to prevent the earth being washed away a protection of reed or willow matting is laid on and secured by stakes. On the land side they are strengthened by piles and planking, the interstices being filled in with stones, and the whole covered with earth and turfed. A height of 30 or 40 feet is frequently attained by such dykes. Those of the Helder, in N. Holland, furnish an example of D.-building on a stupendous scale. In Scotland, the term D. is applied to any stone wall which serves as a fence.

Dyke, in geology, the name given to extensive masses of volcanic or igneous rocks, forming wall-like partitions, which separate the edges of otherwise continuous strata or beds. Dykes generally occur in volcanic districts, and as seen in the neighbourhood of recent or active volcanoes, they may be traced abundantly, branching out in every direction. Sometimes they may be traced continuously for long distances (as in a D. 50 feet thick extending across the Yorkshire coast N.W. for 10 miles), and they may be found either to occupy the place of dislocations or fissures, or to have cut their own way through continuous strata. Dykes are usually vertical or wall-like in form, and are hence distinguished from *veins*, which may be at any angle, and even run between horizontal strata. They vary in thickness from a few inches to 60 or 70 feet. If our means of tracing dykes were at all perfect, we should probably find that they could be in almost every case traced into the parent mass of igneous rock from which they had originally flowed. In the case of 'trap-dykes,' the sides present a remarkable evenness and uniformity; and this regularity of thickness and formation often tends to show that the dykes have merely filled up previously existent fissures, and have not themselves been the original cause of the solution of continuity between strata. They are common near coal-fields, and frequently perplex mining operations from opposing a barrier, often of great and indefinite extent, to the continuous nature of the coal-seams. Dykes are interesting objects to the geologist from the effects they have had in altering the surrounding strata—coal, limestone, and other rocks having had their texture widely altered from the intrusion of these igneous formations.

Dynactinom'eter (Gr. *dynamis*, 'power;' *actis*, 'a sun beam;' and *metron*, 'a measure'), an instrument for measuring the intensity of the light-rays of the sun and comparing the powers of object-glasses. See Claudet's paper in the *Philosophical Magazine* for June 1851, and Hunt's *Photography.*

Dynam'ics (Gr. *dynamis*, 'force' or 'power') is the science which investigates the action of force; or, more correctly, the effects produced upon a given material system by a given transformation of Energy (q. v.) in a given time. In its more restricted sense, it treats of the *motions* and *equilibrium* of particles and rigid bodies under the action of moving forces, thus naturally splitting up into *Kinetics* (q. v.) and *Statics* (q. v.). When used in connection with other departments of natural philosophy, it is qualified by a prefix, as, for instance, Aërodynamics, Electrodynamics, Hydrodynamics, Thermodynamics, to each of which the reader is referred for further information. The foundation of all dynamical science is Newton's Laws of Motion, containing as they do a clear philosophical conception of the three fundamental units of space, time, and mass, without a true knowledge of which advance is impossible. The progress or history of D. is inseparably connected with the names of Archimedes, Galileo, Kepler, Newton, Bernoulli, Huyghens, D'Alembert, Euler, Clairaut, Lagrange, Laplace, Hamilton, &c. The wonderful generalised theorems of Lagrange, whose mathematical insight has perhaps never been equalled, deserve especial notice; while the new and powerful Hamiltonian analysis, Quaternions, has in the hands of its originator and others yielded such striking results already, that it seems destined to extend and strengthen the science to a degree never before dreamt of, especially in the departments of electricity and light.

Dyna'mite, a name applied to several mechanical mixtures of the explosive liquid nitro-glycerine and absorbent matter, as infusorial earth, silica, Tripoli powder, mineral ash, &c., and the name is also given to other compounds which contain, in addition to the nitro-glycerine and an absorbent, substances semi-explosive, or decomposable on explosion, as resin, charcoal, sulphur, nitrate of potash, soda, and ammonia, &c. The disastrous explosions, often without assignable cause, which accompanied the employment and transport of nitro-glycerine after its discovery, and the great danger at all times attending its use, led Mr A. Nobel, a chemist, to experiment upon its behaviour and explosive force when absorbed by inert substances. In 1867 he announced his discovery of a preparation, to which he gave the name D., which robs nitro-glycerine of its treacherous character, while it retains its high explosive power, thereby rendering the new compound one of the safest, most useful, and most powerful explosives known. In the following year Mr Nobel read a paper on D. before the British Association at Norwich. D. is manufactured in large quantities in Germany, France, and elsewhere on the Continent of Europe, in America, and in Scotland. Its manufacture and circulation for industrial purposes in Great Britain began with the establishment of the British D. Company's factory at the Arde Hills, in Ayrshire, towards the end of 1872. This company manufacture on a large scale two kinds of D., respectively called No. 1 and No. 2. The operations of manufacture are briefly as follow:—For D. No. 1, *kieselguhr*, a porous siliceous earth, obtained in Germany, capable of absorbing three times its own weight of nitro-glycerine, is resorted to. After being calcined to oxidise the iron in it, crushed to a fine powder, and sifted, 25 parts by weight of *kieselguhr* and 75 parts by weight of nitro-glycerine are kneaded into a paste and passed through a sieve. D. No. 1, so prepared, is a loose plastic powder, with a reddish-buff colour, due to peroxide of iron. In D. No. 2, nitrate of potash and carbon take the place of siliceous earth. The proper ingredients and proportions are—71 parts by weight of nitrate of potash, 10 parts by weight of powdered charcoal, 1 part by weight of paraffin, and 18 parts by weight of nitro-glycerine. The ingredients being thoroughly incorporated, form a black moist powder, drier than D. No. 1. Both descriptions of D. are put up into paper-cased cartridges, weighing from 1 to 4 oz., for storage or use. During storage the chief danger attending the use of these cartridges arises, for if the D. is not carefully prepared, any excess of nitro-glycerine exudes through the paper wrappers, and accidental explosion might result from slight friction or concussion. Parchment, however, is said to be impervious to nitro-glycerine, and if such be the case, it will be a manifest advantage to use it for cartridge cases. D., unlike nitro-glycerine, cannot be exploded by heat, a spark, friction, or concussion, and if ignited in any other way than by violent percussion in the open air, and in moderate quantity, it burns quietly away. A special committee, appointed by the British Government, recently carried out extensive experiments with D., and it was shown that a box containing 50 lbs. did not explode when ignited by a light, but that a violent explosion followed in similar circumstances with a large quantity. D. explodes with a force ten times greater than its weight of gunpowder, if ignited by the detonation of a fulminating capsule or fuse. MM. Roux and Sarran, in experimenting with Vouges D. No. 2, containing 50 per cent. of nitro-glycerine, found that ignition otherwise than by fulminating powder was followed, when the material was confined, by an explosion the effect of which was only equal to twice the weight of gunpowder, whatever the temperature or pressure. It seems, therefore, that an explosion of two orders can be excited in D., one exerting a force five times greater than the other.

D., like nitro-glycerine, congeals in cold weather, in which state it is less explosive, and does not exert the same power as when plastic; heat, however, restores it to its ordinary condition. In Great Britain the industrial applications of this valuable explosive agent are confined chiefly to mining and blasting. Its efficiency in detaching large masses of rock, in removing substantial obstructions in rivers, and in breaking up large masses of cast-iron, has been amply proved. As compared with gunpowder and gun-cotton, the amount of work performed by D. is greater, with a saving of time and cost. In Germany, France, and elsewhere, it is used for artillery purposes. A penalty of £100, besides 2s. per lb. of material landed, is attached to the importation of D. into Great Britain without a licence.

The following is a list of kindred explosives licensed for manufacture, storage, and use in Great Britain:—

Horsley's Blasting Powder, A and B, consisting of nitro-glycerine (25 per cent.) and an absorbent powder, composed of chlorate of potash, nutgalls, and charcoal.

Brain's Blasting Powder, consisting of nitro-glycerine (40 per cent.) and a pulverised preparation of fine charcoal, sawdust, and mixed chlorate and nitrate of potash.

Lithofracteur, which chiefly differs from British D. No. 2 in containing all the elements of gunpowder. An analysis by Professor Abel gives the typical composition as nitro-glycerine, 42 parts; sulphur, 4; nitrate of soda, 25; sand, sawdust, charcoal, &c., 29.

Dynam'ometer, an instrument for measuring the effort exerted or the work done by a machine. There are three classes of dynamometers, viz.—(1) Those which merely indicate the effort exerted, leaving the distance and time through which it is exerted to be separately noted. Some machines of this class record the effort on paper by self-acting mechanism, as well as indicate it. (2) Those which record both effort and distance, generally in the form of a curve, of which the ordinates represent the magnitudes of the efforts exerted or resistances overcome, and the abscissæ the distances moved through,—the area consequently giving the product of these two, *i.e.*, the work done. (3) Those which, by means of suitable apparatus, record the work done; the product, that is, of the effort (or resistance), and the distance through which it is exerted. These are called integrating dynamometers. In Class 1 the ordinary friction brake and some kinds of spring balances are used for the purpose of measuring effort; to Class 2 most dynamometers used for measuring traction belong, and the steam-engine indicator; to Class 3, Ashton and Storey's power meter, &c.

Dyoor ('men of the woods'), a race of Central Africa, in the region of the Upper Nile. The Dyoors are of a noble negro race, with small development of jaw and graceful slimness of limb. They occupy a small territory, and are not over 20,000 in number. Occupying a ferruginous district, they are famed for their skill in ironwork, and provide the coin which circulates in the whole Upper Nile region—*i.e.*, spades and spear-heads. Like the Shillooks of the N., from whom they are derived, and whose dialect they use, the Dyoors can gain a livelihood in various ways. Besides working in iron, they farm, hunt, and fish, and are quick and ingenious in constructing wickerwork and pottery. The Nubian slave-dealer has greatly injured the prosperity of the Dyoors. The river D. traverses the country of the same name, and is a large tributary of the Ghazal, which it joins about 150 miles S.W. of the confluence of the latter with the Nile.

Dy'sart (Lat. *desertum*, in ecclesiastical Latin, 'a religious solitude'), a seaport and royal burgh in Fifeshire, Scotland, on

the Firth of Forth, 12 miles N.N.E. of Edinburgh, has some shipbuilding, flax-spinning, damask-weaving, coal and ironstone mining, fishing, &c. It is quaintly built, on a rocky site, and attracts summer visitors. Along with Kirkcaldy, Burntisland, and Kinghorn, D. sends one member to Parliament. Pop. (1871) 8919. D. was formerly connected with the monastery of Culross or Kirkcaldy, and near to it is the cave of St Serf.

Dys'entery (Gr. *dys*, and *enteron*, 'the intestine') is a severe inflammation of the large intestine, accompanied with much fever and great prostration. It is characterised by great pain and frequent stools, the discharges being mixed with blood and mucus. The urine is generally high coloured and scanty, and scalds the patient during micturition. D. is rare in temperate climates, but common in the tropics, and is one of the most fatal diseases to armies in the camp. Its origin is often ascribed to low, damp, malarious districts. The treatment consists in a change of air and the use of astringents, especially gallic acid and opium. Ipecacuanha in scruple or drachm doses is very beneficial, and is much used in India.

Dyspep'sia (Gr. 'difficult digestion') is a term used by medical writers for Indigestion (q. v.).

Dyspnœ'a (Gr. 'difficulty of breathing') is a shortness of breath that accompanies all thoracic diseases.

Dysu'ria (Gr. *dys*, and *ouros*, 'urine') means a difficulty in voiding urine. It may depend on various causes, as disease of the bladder or urethra.

Dytis'cus (from Gr, *dytēs*, 'a diver'), a genus of *Coleoptera* (q. v.) or Beetles included in the section *Hydradephaga* or Water-beetles, in which the legs are adapted for swimming, the two hinder pairs being flat and fringed with hairs. The body is oval and flattened, and the mandibles or larger jaws of strong make. In D. the front legs are short, and the antennæ elongated. The tarsi of the males are wide and flattened. *D. marginalis* and *D. dimidiatus* are two familiar species, common in our brooks and ponds. The spiracles or breathing apertures in these animals are set high on the body, and are covered by the elytra or wing-cases, beneath which a supply of air for respiration is carried. These beetles are carnivorous in habits, as also are their larvæ. *D. marginalis*—the great water-beetle—is about 1¼ inch in length.

Dyv'eké, or **Duveké** (Dutch, 'a dove'), the mistress of Christian II. of Denmark, was the daughter of Sigbrit Wylms, an innkeeper, and was born at Amsterdam, 1488. She first met her royal lover at Bergen in 1507, followed him to Copenhagen (1513), and there the guilty relation was renewed notwithstanding his marriage with Isabella, daughter of the Emperor Karl V. The subsequent interference of the ambitious Sigbrit Wylms with public affairs seems to have stirred the hatred of the nobles, and either to this cause or to the baffled passion of Torben Oxe, governor of the palace, is ascribed a plot to poison D., which was successfully carried out in 1516. Among the many works of fiction founded on this story are *Dyveké*, a well-known tragedy by Samsöe, a Dane (Ger. transl. Leips. 1810); *Täubchen von Amsterdam*, a tragedy by Marggraff (Leips. 1839); and *Sybrecht Willms*, a romance by Ida Frick (Dresd. 1843).

Dy'vour (from the Fr. *devoir*, 'to owe'), and **Dyvour's Habit**, are terms of Scotch law. According to Skene, a D. is a bankrupt 'who, being involved and drowned in debts, and not able to pay or satisfy the same, for eschewing of prison and other pains, makes cession and assignation of all his goods and gear in favour of his creditors, and does his devour and duty to them, proclaiming himself bairman and indigent, and becoming debt-bound to them of all he has.' During the 17th c. dyvours were appointed by orders of the Court of Session to sit on a pillory at stated times near the market-cross of Edinburgh, in a coat or upper garment, half yellow half brown, with a particoloured cap or hood on the head. In granting the Cessio Bonorum (q. v.) it was the practice, until the passing of the Act 6 and 7 Will. IV c. 56, to dispense with the habit, and by that statute it is abolished.

Dzigg'ethai, or **Koulan** (*Asinus Onager* or *Hemionus*), a species of *Equidæ* or *Solidungula* forming one of the species of wild asses inhabiting Persia, India, Mesopotamia, &c. This animal is somewhat mule-like in appearance. Its colour is reddish brown in summer, the tints becoming greyer in winter, while a black stripe runs along the spine. The D. is a wonderfully swift and agile animal, and is hunted in Persia and India.

E.



E the second vowel and the fifth letter of the English alphabet. It exactly corresponds to the Semitic *He*, except that all the derivative alphabets have followed the Greek, which turned it to face the right, instead of the left, E instead of Ǝ. In its origin it is properly a weakened form of *a*; and many languages, especially those of India, are almost able to dispense with its use. It is particularly liable to be interchanged with the stronger vowel *a*, in passing from one cognate language to another, and consequently its philological value is small. The Greek alphabet in its later days possessed two forms of E—*epsilon*, or short E, the original letter borrowed from the Phœnician; and *ēta*, or long E, the form of which as a capital was H, the Semitic *Cheth*, or hard aspirate.

The pronunciation of E is very irregular, especially so in English. Its normal phonetic value is that of an open or long *a* or *ai*, which is hardly heard at all in English, unless in such exceptional words as 'where,' 'grey,' vein,' but may be universally found in Italian and French. The sound may be either short, as in French *et*, or long, as in *père*. By far the most common sound of E in English is that which is really the appropriate value of the stronger vowel *i*, which is often expressed in transliteration from foreign languages by a double E. This may be exemplified by 'me' and 'see.' This sound is also maintained for most of the diphthongs formed with E, as 'read,' 'siege,' 'receive.' But the English usage is too variable to allow of any universal rules. In Modern Greek, both the short and long E, the vowels *i* and *u*, and the diphthongs *ei* and *oi*, are all pronounced like the short English E. It must also be noticed that this letter has a strong tendency to become mute at the end of words, *i.e.*, to lose its own sound altogether; while it commonly lengthens the vowel of the preceding syllable, as in English 'cane' or French *mère*. At the same time it softens *c* or *g*, if those be the immediately preceding letters, as in 'face' and 'cage.' In some words adopted from French or Latin, as 'examine,' 'preterite,' the final E is simply useless. As an abbreviation, E most generally stands for East. It is also found in *e.g.*, for *exempli gratiâ*; and *i.e.*, for *id est*.

E, in music, a note a major third above C. The vibration ratio E : C is equal to 5/4.

Ead'gar (mod. *Edgar*), an English king, the second son of King Eadmund, was born about 940, and in 956 was chosen king of Mercia and Northumberland in place of his brother Eadwig, who had enraged the churchmen, and especially Dunstan (q. v.), by an uncanonical marriage. In 960 Wessex yielded to his rule. Under E., whose policy was solely moulded by Dunstan, civil strife and the Danish descents ceased, and the English kingdom was consolidated. Among his titles was *Anglorum Basileus*, and it is said that once eight kings rowed his barge on the Dee, He is reported to have freed Wales from wolves by imposing an annual tribute of 300 wolves' heads on the Welsh. See DUNSTAN.

Eadgar the Ætheling, a grandson of Eadmund Ironside, chosen king by the English in 1066, after the battle of Hastings. His chief supporters, Eadwine and Morkere, Earls of Mercia and Northumbria, being forced to retreat before the Duke of Normandy, E. headed the deputation which offered William the crown, but afterwards fled to Scotland, where his sister Margaret married Malcolm Canmore. The Northumbrians, in league with Sweyn of Denmark, proclaimed E. king of England, but were unable to cope with William, and E. again sought refuge with Malcolm. He was afterwards a dependant at William's court, and became a friend of Robert Duke of Normandy. On Malcolm's death, in 1097, he drove Donald Bain from the Scottish throne, on which he placed his nephew Edward as an English feudatory. He is said to have accompanied Duke Robert to the Holy Land, and in the struggle between Robert and Henry I. was taken prisoner, but shortly freed by Henry. William of Malmesbury says he lived to an old age, but the date and manner of his death are unknown.

Ead'mer of Can'terbury, a figure of some note in English history and literature, flourished in the early part of the 12th c. He became prominent in the struggle between the sees of Canterbury and York for supremacy over the Scottish Church. When King Alexander I. desired a bishop for the vacant see of St Andrews, E. was sent by Archbishop Ralph in 1120. He was elected; but the king, wishing to have an independent Scotch bishop, would not permit his return to Canterbury for consecration. E. accordingly went back to his monastery; but repenting afterwards of this step, wrote to the king expressing his willingness to return. Alexander, however, declined; and the see of St Andrews remained vacant till E.'s death, which took place in 1123 or 1124. His chief literary works are the *Vita Anselmi* (Life of St Anselm), and *Historia Novorum* (history of his own times). In the *Vita* we see the dim reviving of a national spirit in our literature. The *Historia* is in the main reliable, and contains facts of interest not to be found elsewhere. A selection of E.'s writings, edited by the monks of St Maur, is published at the end of Father Gerberon's edition of Anselm's works (Paris, 1675 and 1724). E. was a voluminous ecclesiastical biographer. Among his lives of saints are those of St Dunstan, St Wilfrid, and St Oswald. These are published by Wharton in the *Anglia Sacra*, part ii. (Lond. 1691). An account of E.'s relation to Scotch church history is contained in Grub's *Ecclesiastical History of Scotland*, vol. i.

Ead'mund (mod. *Edmund*) **Ironside**, son of Æthelred the Unready, was born in 989. When Cnut invaded England on Æthelred's death in 1016, E. was chosen king by the citizens of London, and opposed the Danes with great bravery and energy. After defeating Cnut at Gillingham, Sherston, Oxford, and Brentford, he was signally beaten at Assandun, Essex, and agreed to resign Mercia and Northumbria to Cnut, himself retaining the rest of the country. Shortly after, E. was poisoned at Oxford, through the agency of Cnut or of Eadric of Mercia, in 1016, and Cnut became sole king of England. The great-granddaughter of E., Matilda, was married to Henry I.

Ead'ward (mod. *Edward*) **the Confessor**, son of Æthelred the Unready and Emma, daughter of Richard Duke of Normandy, was born in 1004, and lived in exile at the Norman court until 1042, when he became king of England on Harthacnut's death. His accession was largely due to the adroit Godwine, Earl of Wessex, whose daughter Eadgyth was married to E., and who became for a time virtual ruler of the country. E. greatly favoured the Normans frequenting his court, promoting them to high posts in the church and state. One of these unpopular strangers—Eustace, Count of Boulogne—had an affray with the men of Dover, whom E. ordered Godwine to punish. He refused, levied an army, and demanded the dismissal of the Normans; but being unable to resist the king, withdrew to Flanders, whence he was recalled in 1052 to allay the indignation of the people. Godwine died shortly afterwards, and his son Harold became actual ruler of England until E.'s death in

1066. In this reign the *Danegelt* was repealed, a digest of the laws formed, and a certain polish communicated to the English through intercourse with Normandy, while the growing influence of a Norman party prepared the way for the Norman conquest. Under E. the country was prosperous; two wars were carried on against the Welsh, and a successful expedition was sent into Scotland to support Malcolm Canmore against the usurper Macbeth. See Freeman's *History of the Norman Conquest* (Lond. 1876), and Luard's *Life of Edward the Confessor* (Lond., Longman & Co., 1858).

Eadwi'ne (mod. *Edwin*), an English king whose history forms one of the most beautiful and romantic tales in Bede. He was the son of Ælla, king of Deira, and was born in 586. On Ælla's death in 589, E.'s uncle, Æthelfrith, seized the crown of Deira, and E. spent his youth as a homeless outlaw, until Rædwald, king of E. Anglia, espoused his cause, defeated Æthelfrith, and made him monarch of all Northumbria. According to Bede, whose account of E. is clearly inwoven with fiction, E. was at Rædwald's court visited one night by a mysterious man, who foretold his greatness if he should espouse a new faith, and bade him remember a certain sign. E. was soon the most powerful king in England, became overlord of the country from the English Channel to the Forth, where he founded Edinburgh ('Edwin's burgh'), and for eight years ruled so sternly and justly that it was said 'a woman with her babe might walk scatheless from sea to sea in E.'s day.' In 625 he married Æthelburh, a Christian princess, sister of Eadred, king of Kent. She brought with her to Northumbria various churchmen, the chief being Paulinus (q. v.), the great missionary of the N. of England. After a narrow escape from an assassin sent by Ceawlin, king of Wessex, whom he forthwith defeated, and, according to Bede, a second appearance of the mysterious man, E. was baptized at Eoforwic (York) in 627, and strongly forwarded the spread of Christianity in England. Penda of Mercia, however, a fierce pagan, bent on shaking off the Northumbrian overlordship, defeated and slew E. at Hatfield in 633, a battle which delayed the conversion of the North and Midlands. E.'s reign, from its connection with the Christianising of England, is one of the most important in English history. See Freeman's *History of the Norman Conquest*, vol. i.

Eagle (Fr. *aigle*, Lat. *aquila*, from the root *ac*, 'sharp, swift'), a genus of Raptorial birds, forming the type of the sub-family *Aquilinæ*, which group in its turn is included in the family *Falconidæ*. As a sub-family the *Aquilinæ* are recognised by the bill being straight at the base, and acutely arched towards the tip; the edges being wavy, and the nostrils being situated in front of the Cere (q. v.). The tail and tarsi are elongated, and the inner toe is of stronger make than the other three toes. The genus Aquila, including the most typical eagles, is recognised specially by the large oblique nostrils, by the wings having the fourth and fifth quills longest and of equal length, and by the tarsi being feathered to the bases of the toes. The tail is broad and rounded. The E., known popularly as the 'king of birds,' has been held to represent all that is graceful and powerful in the bird creation. It is eminently rapacious, carrying off for prey many small animals, and even attacking man himself when it is roused or irritated. The nest, or *eyrie*, is built in an exposed situation, and is rudely constructed of sticks and other materials loosely aggregated together. The eggs usually number two, and are of a whitish colour. The most celebrated and typical of the eagles is the golden E. (*Aquila chrysaetos*), found in both Old and New Worlds. This bird may attain a size of 3½ feet in length, the expanse of wings measuring 9 feet. The females are larger than the males. The colour is a general blackish brown, the head and neck feathers being tinted of a golden-red hue. The legs and thighs are greyish brown, and the tail a deep grey with brown bars; the feet and cere are yellow. In England the E. is extinct, but it occurs in the N. of Scotland and N. of Ireland. Other species of true eagles are the imperial E. of Asia and S. Europe (*A. mogilnik*); the bold E. (*A. audax*) of Australia; the former known by a white patch on the scapular feathers, and the latter by the reddish hue on the back of the neck. The booted E. (*A. pennata*) is found in Asia and Central Europe, and is of a dark-brown colour. To the allied genus *Spizaetus* belongs the martial E. (*S. bellicosus*) of S. Africa; while the crested or harpy E. (*Thrasaetus Harpyia*) is also included in a different group. The Sea-Eagles and Bald Eagles (q. v.) belong to the genus *Haliaetus*. The name E. is also applied to birds belonging to widely different genera from the above. Of the latter, examples are found in the E.-Hawks (q. v.); the New Holland White E. (*Astur Novæ Hollandiæ*), and other forms.

Eagle, in heraldry, is one of the earliest charges, and holds the same position among birds as the lion among beasts. It was the emblem of St John, of regal power, and of courage and magnanimity, and was generally borne *Displayed* (q. v.). When represented as double-headed, it is sometimes spoken of as the *imperial*; when single-headed, as the *royal* E.

Eagle, as a military standard, is first mentioned in Xenophon, who states that it was customary in Persia to have a golden E. with outspread wings borne on a spear in front of the army. This custom of the Persians was adopted in Egypt under Ptolemy Soter. The emblem of the Republic, as well as that of the Empire of Rome, was the E. armed with lightnings—the symbol of Jupiter. This device was adopted as the Roman military standard in the second consulship of Marius (B.C. 104). The E. of the Roman legions was fixed upon a long shaft or spear, with outspread wings, as about to soar into the sky, grasping the thunderbolts in its talons, and, in later times, surrounded with laurels. The eagles were first made of wood, afterwards of silver, and later of gold. On the march they were always carried by the cohorts of the van; in camp they stood in the Prætorium, fixed in the earth. Desertion or loss of the E. was punished with death. As a military standard during the middle ages the E. had no more than an heraldic importance. Napoleon I (1804) revived its use in the army as a fitting symbol of imperial France. The French E. is the golden E. of Zeus plumed for flight, and bearing the lightnings in its claws. Under the Bourbons it was superseded by the tricolor, but it was restored under Napoleon III. by decree 1st January 1852. The E. has also been adopted as their national military ensign by Russia, Germany, Austria, and the United States of America. The black double-headed E. of the Latino-German empire is represented with a head and neck looking to the right, and another head and neck looking to the left; holding the sceptre in the right talon, and the imperial globe in the left. This E. was originally single-headed, and is said to have been adopted by Karl the Great, at his coronation in Rome, as a symbol of the empire he had founded. To indicate the E. and W. Roman Empire, or the union of the imperial and kingly office, the double-headed E. first occurs on an imperial coin struck in 1325 by Ludwig of Bavaria.

Eagle, an American gold coin of the value of ten dollars.

Eagle Hawk, a town in Victoria, 4½ miles from Sandhurst (q. v.), and 105 miles N. W. of Melbourne (q. v.). It is in the heart of a very important gold-mining district. Pop. (1875) 6590.

Eagle-Hawk, a name given to certain species of Raptorial birds of the genus *Spizaetus*, nearly allied to the *Aquilæ* or Eagles (q. v.). In this group the tarsi are long and slender, and the toes are long and powerful. These birds otherwise resemble the eagles, and inhabit Asia, S. America, and Africa. A good example of the group is the crested E.-H. (*S. cristatus*) of Guiana.

Eagle, Order of the Black, the highest Prussian order of knighthood, was founded in 1701 by the Elector of Brandenburg, on his coronation as King of Prussia. Excluding the royal family, the number of knights was at first restricted to thirty, but is now undetermined. The insignia are a blue cross and a B. E. between each of the eight arms of the cross. Knights of this order are also knights of the **Order of the Red Eagle**, founded by the Markgraf of Bayreuth in 1734, incorporated with the order of the B. E. in 1791, and re-organised in 1810.

Eagle-Owl, or **Great Owl** (*Bubo maximus*), a species of Raptorial birds belonging to the sub-family *Buboninæ* or 'eared' owls, and to the family *Strigidæ*. The genus *Bubo* is distinguished by the moderately-sized bill; by the wings having their second, third, and fourth quills longest; the tail being of moderate size and rounded, and the tarsi thickly feathered. The E. O. is found in N. Europe, and also occurs in Italy and Turkey. It is rare in Britain. Its average length is 2 feet, and its usual colour is a yellow tinged with brown, and marked

on the upper parts with black or dark-brown bars and spots. The beak and claws are black. The Virginian Eared Owl (*Bubo Virginianus*) is the E.-O. of America. The throat in the latter is pure white in colour.


Eagle-Owl.

Eagle-Wood, or **Aloes-Wood,** the wood of *Aloexy Agallocha* and of *Aquilaria ovata*, plants belonging to the natural order *Aquilariaceæ*, in which the trees have exstipulate leaves and exalbuminous seeds. They are natives of tropical Asia. The wood above named affords a fragrant resin, which, as a remedy for gout, has some repute in India. It is probably the *Ahalim* or *Ahaloth* of the Old Testament, and the 'aloe' of the New Testament, translated 'aloes.'

Ear (Old Eng. *eáre*, Ger. *ohr*; comp. Lat. *aur-is*). The organ of hearing is usually divided by anatomists into three parts—the external ear (1, 1, 1), the tympanum or middle ear (3), and the internal ear or labyrinth (6). The first two are not essential to hearing, the mechanism of which is, strictly speaking, in the third portion or labyrinth. The external ear consists of that part of the outer ear projecting from the head called the *pinna* (1, 1, 1), which is apparently for the purpose of collecting and reflecting waves of sound into the external auditory passage or *meatus* (2), which, in turn, conducts the sound to the membrane of the tympanum (2′). This external auditory canal is 1¼ inches in length, and is formed partly of cartilage and partly of bone. It is lined by an infolding of the skin, in which are numerous glands, which secrete the 'wax of the ear.' The middle ear, or tympanum (or drum), is a small cavity in the temporal bone, shut off from the external auditory canal by the membrane of the drum, but communicating with the air in the pharynx, or throat, by means of a channel called the *Eustachian tube*. In this little chamber we find a chain of small bones, which communicate the movements or vibrations of the membrane of the drum to the labyrinth. This chain consists of three bones, namely, the *malleus*, or mallet (*a*, Fig. 2), which is attached to the membrane of the drum; the *incus*, or anvil-bone (*b*); and the *stapes*, or stirrup (*c*), the base of which is fixed into an oval opening in the labyrinth, termed the *fenestra ovalis*, or oval window, immediately below 6 in Fig. 1. Between the bones there are well-formed joints, and this arrangement has been proved by Helmholtz to form a lever which communicates to the internal ear the oscillations of the *membrana tympani* in such a manner as to diminish their extent or amplitude, while it increases their intensity.

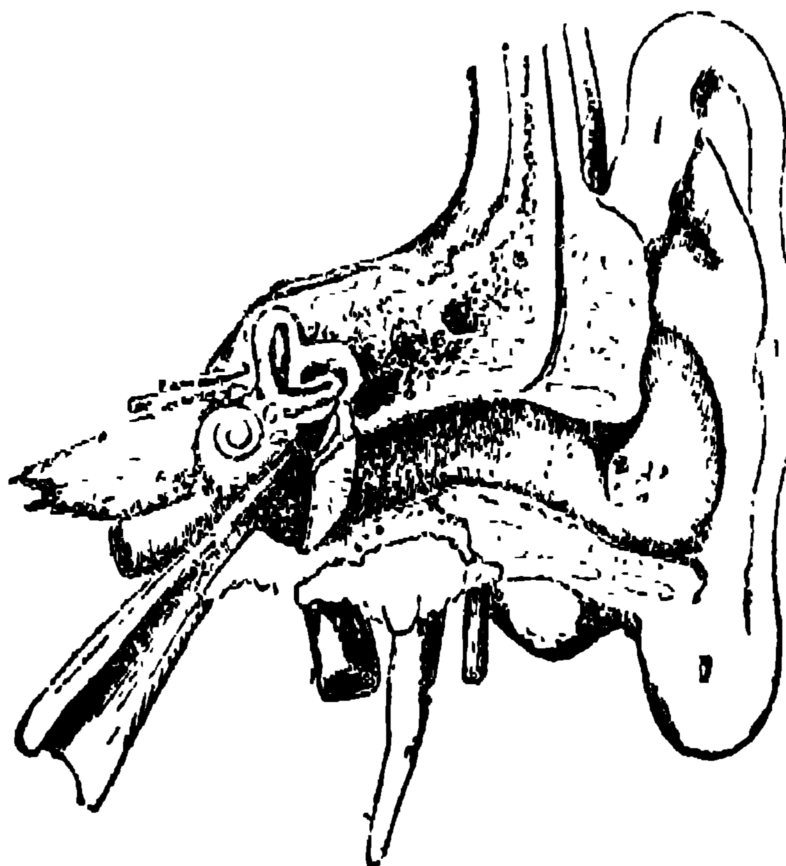

Fig. 1.



Fig. 2.

The internal ear is placed in the petrous portion of the temporal bone, and on account of its complicated structure it is usually called the *labyrinth*. It consists of a cavity hollowed out of the bone, called the *osseous* labyrinth, in which there is a membranous structure of the same form, called the *membranous* labyrinth. Between the membranous and osseous labyrinths we find a fluid called *perilymph*, while in the interior of the membranous tube there is another fluid known as the *endolymph*. The osseous labyrinth is divided by anatomists into three portions, namely, a central part called the *vestibule* (1) (Fig. 3), with three canals, called from their form the *semicircular canals* (2), on the one side, and a complicated coiled part on the other side, named, from its resemblance to a snail-shell, the *cochlea* (3). In the interior of the osseous labyrinth (Fig. 3, natural size) we find corresponding portions of the membranous labyrinth, which supports ramifications of the auditory nerve. The ultimate structure consists of minute hairs immersed in the endolymph, and connected by the medium of cells with the terminations of the auditory nerves. These hairs are believed to take up the vibrations communicated to the endolymph by the chain of bones or through the bones of the head, and to vibrate so as to affect the terminations of the nerves. The nerve filaments convey the impression to the brain, and the effect is a consciousness of sound. By most authorities the vestibule is believed to be the part of the ear by which we appreciate sound merely as sound, without reference to pitch or direction. In this part of the ear we find small masses of crystals of carbonate of lime called *otoliths*, which, lying in the endolymph, may be supposed to touch the hair-like bodies already referred to, and thus through them excite the nerves. The vestibule is the first part of the internal ear met with in the animal kingdom. The functions of the semicircular canals are not understood. Some have supposed that as they are placed in the three directions of space, they may assist in the comprehension of the *direction* of sound; others that they have to do with the sense of rotation; while a third class of physiologists suppose they assist us in the sense of equilibrium in different positions. It may be safely asserted that no good and sufficient proof has been offered for any of these views, but the balance of evidence shows that they are really connected with hearing, and not with a mere sense of equilibrium or of rotation. The cochlea is by far the most complicated part of the internal ear. The membranous portion consists of a tube called the *ductus cochlearis*, so placed in the osseous cochlea as to have a space on each side of it, the one commencing at the vestibule being called the *scala vestibuli*, or vestibular staircase, and the other termed the *scala tympani*, as it terminates at a round opening closed by a membrane known as the *fenestra rotunda*, or round window, on the other side of which is the cavity of the tympanum. In the *ductus cochlearis* we find a remarkable structure known as the *organ of Corti*, far too complicated and minute to be fully described here. It was first discovered by the Marquise di Corti, an Italian nobleman, who devoted much of his time to microscopical research. Its intimate structure is not fully understood, but suffice it to say that in it we have an apparatus specially fitted for the appreciation of sounds of different *pitch*, and of different *quality* or *timbre*. The modern theory, propounded by Helmholtz, is that in the cochlea there are numerous delicate structures tuned to vibrate to notes of a particular pitch. For further details regarding the anatomy of the E., see *Quain's Anatomy*, vol. ii., and *Sensations of Tone*, by Professor Helmholtz, translated by Mr Alexander J. Ellis (Lond. 1875).



Fig 3.

Ear, Comparative Anatomy of.—In the lower animals organs of hearing are probably represented for the first time, as we proceed from lower to higher forms, in the cœlenterate *Medusidæ*, or jellyfishes, and allied forms. In these animals we meet with sacs containing fluid, with calcareous or living particles, named *otoliths*, therein suspended. This simple apparatus is evidently intended, when placed in communication with a nerve filament or its equivalent, to intensify the vibrations of sound, and to convey an auditory impression to the animal. These *auditory vesicles*, as they are called, exist, for example, around the margin of the bell-shaped disc in the jellyfishes. This simple form of sensory apparatus persists with little modification through invertebrate forms. Thus, in many Rotifera (q. v.) or 'wheel-animalcules,' a similar sac exists near the nervous ganglion. In *Annelidæ* or worms similar vesicles occur, as seen in the *otocysts* or hearing-sacs of *Arenicola* or lobworms, which are placed on the nerve-cords which surround the œsophagus or gullet. In

Arthropoda, such as crustaceans, ears may be represented (as in the lobster) by sacs containing otoliths, and also stiff hairs or bristles (*acoustic bristles*), which latter may be attached to the otoliths. The auditory organ in the lobster exists as an open sac at the base of the lesser antennæ or 'feelers,' and is supplied by a branch of the internal antennary nerve. Some nearly allied forms (*e.g.*, shrimp, *Crangon*) want organs of hearing, and in others (*Mysis* or opossum shrimps) the ear-sac is closed. In spiders and their allies (*Arachnidæ*) no specialised organs of hearing have been discovered, but in some few insects (crickets, locusts, &c.) they have been demonstrated. In the former of these insects auditory vesicles, with acoustic hairs, exist under the 'knee' joints of the front pair of legs, and in locusts on the same pair of legs. Some flies possess allied organs, whilst in many other insects the function of hearing has been ascribed to rod-like bodies borne on the antennæ or feelers. In *Myriapoda* (q. v.) (centipedes, &c.), no ear-vesicles apparently exist. In mollusca, organs of hearing are generally developed. In Lamellibranchiates (q. v.) they exist on the pedal nerve-ganglia, and appear as sacs or vesicles filled with fluid, lined with epithelium, and containing otoliths which rotate rapidly during life. In Gasteropods (q. v.) paired ear-vesicles exist behind the eye, and close to the pedal ganglia. As many as a hundred otoliths are found in *Pleurobrachiæ*, and forty in *Doridæ* or sea-lemons. In the river-snails (*Paludinæ*) the ear-sac can be moved by special muscles, and an outer ear-passage is imitated in some snails. In cephalopods or cuttlefishes ear-sacs exist as rounded vesicles, usually placed near the head-cartilage. It contains one or more otoliths. The organ of hearing in the various groups of vertebrates will be found to be noticed under such heads as ORNITHOLOGY, ICHTHYOLOGY, REPTILIA, &c.

Ear, Diseases of.—The external E. is occasionally the seat of special affections, such as fibrous tumours, gouty concretions in gouty subjects, hypertrophy in the case of idiots, and sanguineous tumours following or accompanying attacks of acute mania. Inflammation of the external E., *otitis* or *earache*, is usually a rheumatic affection, characterised by intense pain, and generally associated with hemicrania. In *otorrhœa* there is a fetid muco-purulent discharge, owing to inflammation of the mucous surfaces or necrosis of the petrous portion of the temporal bone. The E. is also occasionally the seat of polypi. For diseases of the internal E., see DEAFNESS.

Ear-Cockles, also designated **Purples** or **Peppercorn**, a disease in wheat, produced by the *Vibrio tritici*, a species of Infusoria, in form like a worm, only more attenuated at both extremities, and of light-yellow colour. Its eggs deposited in the kernel turn at first into an unhealthy dark-green, which changes into black, and the shape becomes like that of a peppercorn. A white cottony substance fills the grain, and this dissolved in water sets the *vibriones* free in thousands. As many as 50,000, Henslow estimates, may exist in one grain, but this calculation is made at random. Farmers are much troubled with these *vibriones*, as their vitality, in dry wheat, lasts seven years, and in sowing there is nothing to indicate the presence of the animalcula, which, developed by the germination of the grain, blackens the fields in harvest.

Earl. According to Cruise (*On Dignities*, p. 53) there were three kinds of E.—(1) Where the dignity was annexed to the seisin of an entire county with *jura regalia*, including jurisdiction and the right to all royal services and estreats; this was a Palatine (q. v.); (2) where only the title was taken from a county, but no land was held, the revenue (*tertium denarium*) being derived from the profits of the pleas in the county court; (3) where the crown granted land to be held *per servitium unius comitatus*. *Comes* is the Norman equivalent of E., and is of course used in all the charters after the Conquest. Earls are now created by letters patent, and the title is often derived from names of private estates or family names. An earldom, like a barony, was held *in capite*, the principal mansion, or, where there was none, a royal castle, of which the E. was governor, being *caput comitatus*. The 'relief' of an earldom generally consisted of arms and horses. The possessions of an E. were often called *honours*; hence the honour or estate of Richmond, Arundel, &c. Earldoms were held by the tenure of grand-serjeantry, or attendance on the *curia regis* and *magnum concilium*. In dignity the E. is after the marquis, and before the viscount. He is addressed as 'Right Honourable,' and by the crown as 'our right trusty and well-beloved cousin.' His coronet contains a circle of gold, chased and jewelled, on which are eight small golden pyramids, each with a large silver ball, and a gold strawberry-leaf on the rim between each pair of pyramids; the cap is crimson velvet, turned up with ermine, with a golden tassel.

The Old English *ealdorman* answers to the *princeps* of Tacitus, the *satrapa* and *subregulus* of Bede, the German *graf*, and the *dux* of the Latin chroniclers. He was originally elected by the national assembly, but the office came afterwards to be hereditary, though down to the Conquest the consent of king and Witenagemot seems to have been required. During the annexations the families of the sub-kings continued to act as ealdormen. Thus the ealdordom was not necessarily co-extensive with the later shire, and the ealdor was sometimes superseded by a high reeve. Generally, however, each shire had its ealdorman, who sat with sheriff and bishop in the folc-gemot, receiving one-third of the court-fees (the same as the Karoling *comes* took under capitulary, A.D. 783). As military commander he was called *heretoga*. Where the relation of ealdorman and king has arisen out of commendation, not conquest, the hereditary descent would be sooner recognised. Cnut divided England into four earldoms, and in the time of Æthelred the term E. began to be used instead of ealdorman, a use suggested by the Danish *jarl*. Before this, the English *eorl* and *æthel* had a wider meaning, equivalent to the Latin *nobilis*, the primitive class of noble blood. *Ætheling* was gradually restricted to the king's kin. The *North People's* Law of the 8th c. puts the wer-gild of the eorl 2000 thrymsas higher than that of the ealdorman, but this is attributed to Danish ideas. Historically, the *comes*, or companion of the king's household, is more truly represented by the English notion of *gesith*, who afterwards became king's thegn, than by the general name of *eorl*, or the official title of ealdorman. The special investiture of an E., by girding on the sword, and placing the cap and cloak on the person, is now abolished. See COMES and COUNT.

Earl Marshal, originally Marshal of England, the title of a British officer of state, whose chief functions are to preside over the College of Arms, to take cognisance of matters relating to pedigrees and descents, to make proclamations of war and peace, and to grant armorial bearings. The office is believed to have been established in the reign of Richard II., who conferred it upon Thomas Mowbray, Earl of Nottingham, and it is now hereditary in the family of Howard, the head of which, and consequently E. M. at present, is the Duke of Norfolk. The last grant for the office was made 19th October 1672 by Charles II.

Earl'om, Richard, a distinguished engraver in mezzotint, was born in London, 1742. Among the most celebrated of his works are his *Liber Veritatis, or 200 Prints after the Original Designs of Claude de Lorraine* (1777); his works after Reynolds; and his *Portraits of Characters Illustrious in British History from Henry VIII. to James II.* (1810), in conjunction with C. Turner. E. died in 1822. The practice of etching has prevented the long existence of E.'s style.

Earl'ston, or **Er'cildoune**, a village on the Leader, Berwickshire, 30 miles S.E. of Edinburgh, has manufactures of ginghams, shawls, blankets, tweeds, and flannels. Pop. (1871) 1168. Near E. are the ruins of the Rhymer's Tower, so called as having been the residence of the famous Thomas Learmont, or Thomas the Rhymer (q. v.), to commemorate whom a stone with an inscription has been built into the church wall. Its name was changed from Ercildoune to Earlston from its being a seat of the Earls of March.

Early English, a style of Gothic Architecture (q. v.), the special feature of which was the introduction of the pointed arch, which hardly appeared in England till the rebuilding of Canterbury Cathedral in 1175. Down to the year 1200 the round Norman arch was still usually employed in conjunction with the pointed arch, to which it gave place at last, thereafter remaining practically banished as a feature of English architecture for three centuries. The E. E. architects, though deeply influenced by the gravity of the preceding (Norman) style, showed much originality and animation of design. They did not invent the lancet or long pointed window, but they were the inventors of the lancet style of fenestration, or the grouping of such windows together in twos, threes, fives, and sevens. The great window

group consisting of five lancets combined, and called the Five Sisters, of York Cathedral, is a good example of such fenestration. Another distinguishing feature of the style is the use of the tooth ornament, a square four-leaved flower, generally used to enrich the deep hollow moulding of an arch. When thus used, the flowers are placed close enough to touch at the extremities.

Earn (Gael. *Erinn*, 'west'), a river and loch in Strathearn, S. Perthshire, 26 miles W. of Perth. The loch stretches 7 miles from E. to W., and is from 1 to 1½ miles broad, with a depth of 100 fathoms. The river flows out of the loch, and has an easterly course of 40 miles, falling into the Firth of Tay a mile below Abernethy.—*The Bridge of E.* is a village 6 miles S. of Perth, and lies near the mineral springs of Pitcaithley. Pop. (1871) 326.

Earn'est (Lat. *arrhæ*), or **Arles**, as it is called in Scotland, is a small sum of money given as a symbol of the completion of a bargain. The E. is not in any case essential to complete a bargain (see CONSENT, CONTRACT), it is merely a legal item of proof of agreement. In sale, however, E. causes the property to vest in the purchaser, but it does not affect the seller's right to demand the full price before delivery, if credit has not been given, or to stop the goods *in transitu* in case of insolvency. Nor does it affect any of the other rights vested in the seller prior to delivery. The question sometimes arises whether or not E. is to count as part of a stipulated price or wage. This will depend on the intention of parties. If proof of intention be otherwise insufficient, the proportion which the E. bears to the value of the subject of contract will be held to decide the question. 'If a shilling be given,' says Erskine, 'in the purchase of a ship or of a box of diamonds, it is presumed to be given merely in evidence of the bargain, or, in the common way of speaking, it is *dead* E.; but if the sum be more considerable, it is reckoned up in the price.'

Earring (Lat. *inauris*, Gr. *enōtion*), an ornament pendant from, or inserted into, the lobe of the ear. Modern civilised nations regard the E. almost exclusively as a female adornment, but among less advanced and uncivilised people, it is worn by both sexes, a custom which sailors of different nationalities frequently affect. Among the ancient Greeks and Romans the E. was considered effeminate, while in Eastern countries, on the authority of Pliny, it was used by men and women alike. Earrings were worn by the English down to the 10th c. In the 16th c. the fashion was revived in England, and extended even to gentlemen, who followed the example of the courtiers of Henri III. of France. Satirical allusions to this custom are frequent in the writings of contemporary dramatists; it appears to have died out about the period of the Restoration. Earrings assume a great variety of form, and are often of the most costly description, as of gold enriched with precious stones. Pearls were valued for their spherical shape, their size, and their whiteness; but the elongated ones called *elenchi* were also in great esteem as forming a graceful pendant to the ring. Seneca speaks of one which had a couple of pearls above and below the precious stone as worth a patrimony. For elegance of design and beauty of execution, those of the Etruscans and Greeks have never been surpassed.

Ear-Shell (*Haliotis*), a genus of Gasteropodous molluscs, belonging to the family *Haliotidæ*, in which the shell is ear-shaped, with small whorls, and a large aperture. The outer lip is perforated for a siphon, and in ear-shells new holes are successively formed with the growth of the shell. No operculum exists. These shells are much used in inlaying work, on account of the beautiful tints of their nacreous or mother-of-pearl lining. They abound at the Channel Islands, and familiar species are the *Haliotis tuberculatus*, the Ormer or Guernsey E.-S., and the *H. asininus* or Ass's E.-S.

Earth, The. It was generally believed by the ancients, and the belief still lingers among the uncivilised and uneducated races of mankind, that the E. was an immovably fixed, flat, circular disc, round which the sphere of the heavens moved in its daily revolution. Thales of Miletus (640 B.C.), and Pythagoras (506 B.C.), taught that the E. was globular in shape; but Aristarchus (280 B.C.) seems to have been the first to maintain its annual and diurnal motions. This hypothesis was developed and systematised by Copernicus, modified by Kepler, and finally established by Newton, as a consequence of the probably universal law of gravitation. To the mathematical astronomer, the close agreement between the true position of a planet or satellite and that obtained by calculation, is sufficient proof of the truth of the Newtonian system of the universe; but absolutely indisputable evidence is not wanting. The projected circular annual motion of every fixed star, in consequence of the Aberration (q.v.) of light, is an incontestable proof of the annual elliptic revolution of the E.; and the slight eastward displacement from the vertical of a mass dropped from a considerable height cannot but be due to a rotating motion of the E. The diurnal rotation of the E. is, however, made *visible* to the bodily eye by means of Foucault's beautiful pendulum experiment. A freely-suspended pendulum always tends to keep oscillating in the same invariable plane—hence a pendulum oscillating at either pole will appear to an observer on the E. to be continually changing its direction of oscillation, the change being one of rotation in a direction contrary to that of the E.'s motion. A pendulum at the equator will obviously not be affected; while one at any intermediate latitude will be influenced by the resolved portion of the E.'s rotation, which has for axis the diameter through the locality where the pendulum is. By making use of a long, slowly-oscillating pendulum, this effect is easily apparent in our latitudes within the space of an hour. The rotundity of the E., again, is proved by a variety of phenomena, such as the gradual apparent sinking of a vessel at sea, as it recedes from the observer, the invariably circular form of the E.'s shadow during a lunar eclipse, the possibility of circumnavigation, &c. By treating the E. as having been formerly a rotating fluid, Newton deduced that its form should be that of an oblate spheroid—the polar diameter being less than the equatorial, in the ratio of 229 : 230. This difference is too great, the true ratio being very nearly as 299 : 300. Sir G. Airy gives the exact dimensions as 7899·17 miles for the polar diameter, and 7925·17 miles for the equatorial. These results agree to the first decimal point with those of Bessel and Clarke, except that the latter gives two different equatorial diameters, viz., 7926·70 miles in 14° E. long., and 7924·69 miles in 104° E. long.

As important as the determination of the dimensions of the E. is the determination of its *mean density—i.e.*, the density of an equal homogeneous globe as compared with that of water. Newton, with characteristic sagacity, gave it as his opinion that this mean density would be found by experiment to be between five and six times that of water. His prediction has been fulfilled. Hutton and Playfair, from the observations of Maskelyne in 1774 on the perturbing effect produced by the mass of Schiehallion upon an otherwise vertical plumb-line, deduced 4·71; and more recently Colonel James, from similar experiments at Arthur's Seat, obtained 5·316. Carlini and Plana, from the diminution of gravity due to ascending Mount Cenis, gave 4·39. The great uncertainty in these experiments, however, exists in the determination of the magnitude and density of the mountain with which those of the E. are compared. A more delicate and exact method is that suggested by Michel, and performed first by Cavendish (hence the name *Cavendish experiment*), but more recently by Reich of Freyberg, and Francis Baily. The principle involved is the same as in the Schiehallion experiment, viz., the comparison of the E.'s attraction with that of a known mass, which is in this case, however, not an irregular mountain, but a globe of lead. Two large balls are fixed at the extremities of a horizontally-rotatory board; and two of smaller size are attached to the ends of a horizontal bar, which is suspended by a cord over the centre of the board. By careful micrometer measurement with the telescope at some distance, the unrestrained position of rest of the bar is determined. Then by rotating the board until the larger balls are brought, on the opposite sides of the bar, each into close proximity to one of the smaller ones, an appreciable couple will be exerted upon the torsion balance in virtue of the mutual attraction of the masses. This position having been carefully measured, the board is again rotated, until the balls are in such a position as to produce upon the bar a couple equal but *opposite* to the former. From these experiments the observed attraction of a mass of lead of known volume and density can be compared with the known attraction of the E., of known volume but unknown density, and the unknown quantity is easily deducible. The difficulty here exists in the extreme delicacy of the measurements; but this very delicacy, necessitating as it does great care and precaution, renders the method the one upon which we can most depend for accuracy. Cavendish deduced 5·48, Reich 5·438, and Baily 5·66, as the

mean density. Still another method was successfully applied in 1854, as far as regards the experimental part, by Sir G. B. Airy, the astronomer-royal. From a number of pendulum experiments at Harton Colliery near S. Shields, he found that the accelerating force of gravity was increased by $\frac{1}{19190}$th part for a descent of 1260 feet. This gave 6·565 as the value of the mean density—a result, however, which cannot be expected to be so accurate as that deduced from the Cavendish experiment, considering the uncertainty that exists in the determination of the density of the neighbouring rocks, and the geological configuration of the mine and vicinity. We may take, however, 5½ as being very nearly the mean density of the E.; and since the crust of the E. has only a specific gravity of from 2 to 3, it follows that the E. must be considerably denser in the interior than at the surface. But it is demonstrable that a globe of the same size and the same surface density as the E. would have, in virtue of the ever-increasing pressure as one approaches the centre, a mean density of considerably more than 5½, if the magnitude and form were due merely to the mutual gravitation of the whole. There must be some cause, then, acting upon the interior layers, so as to counterbalance the effect of pressure and render the density less than it otherwise would be. This cause is probably heat; a supposition borne out by the fact that, when digging a mine, sinking a well, or making a bore, the temperature is always found to increase with the depth about 1° F. for every 60 feet. This rate of increase must, however, according to Sir W. Thomson, decrease as one descends, if the earth be a cooling body; but the decrease cannot be appreciable for the comparatively small depth to which we can penetrate. At a depth of 50 miles (a mere fraction compared to the whole diameter) the temperature would consequently be over 4000° F., a temperature at which no known substance can remain solid. We are not at liberty to infer from this that the interior of the E. is fluid, because the circumstances under which the material is exposed to this great heat are quite altered—the pressure, in fact, is considerably increased. Now, matter which expands when fused, as almost all known substances do, has its fusing point *raised* by increased pressure; and therefore, recognising the Hopkins-Thomson objection, that the known phenomena of nutation and precession are inconsistent with the internal fluidity of the E., we are forced to the conclusion that the globe is solid throughout. Thomson has further shown that the rigidity of the E. must be, on the whole, greater than that of an equal sized globe of glass, otherwise the *terra firma* would present the phenomena of tides. For the E.'s relations to the other members of the solar system, see MOON, PLANETS, SUN; and in AËROLITES, ATMOSPHERE, CURRENTS, EARTHQUAKES, GEOLOGY, GLACIERS, RIVERS, SEAS, SEASONS, VOLCANOES, WINDS, &c., the reader will find details of the more important phenomena daily occurring on our E.

Earth-Closet System. This system of disposing of human excreta has attracted much attention during the past seventeen years, and was originally proposed as a substitute for the pestiferous cesspool and the wasteful and defective system of water-drainage, and as a simple method of enriching the land with valuable manurial matter, commonly carried to the sea or diverted into our rivers to their pollution. The principle of the E.-C. S. is based upon the fact that *dry earth* is one of the best known disinfectants and deodorisers, and that when it is applied in detail to fresh excrement it renders the fæcal matter at once inodorous and innoxious. Moreover, a compound is formed that is valuable as manure, and capable of easy application to the soil. The introduction of the system, which is in successful operation in many parts of the United Kingdom, as well as in India and America, is chiefly due to the zeal, energy, and mechanical talent of the Rev. Henry Moule, vicar of Fordington, Dorsetshire. Mr Moule's patent earth-closet resembles in outward appearance an ordinary water-closet. Under the seat is a watertight vault bedded in cement, or a movable pail or tank, and at the back is placed a hopper or chamber for holding dry sifted earth. On using the closet for the first time a charge—1½ lbs. by weight, or 1½ pints by measure—of earth is thrown into the receptacle, and after use a second charge is cast down either automatically, on the sitter removing his weight from the seat, or by his pulling a plug-handle. The simple mechanical arrangements of Moule's earth-closet admit of easy modification to meet special wants, and the vault may be emptied or the pan removed either from the outside or inside as desired. The night-soil need not be removed till the vault or other receptacle is filled, as it remains altogether inoffensive. If desired, the earth-manure may be redried, and used over again two or three times, the manurial value of the product increasing with each time it is passed through the closet. The organic matter is disintegrated and absorbed by the earth, and it is only when the earth is saturated with liquid and vapour that it fails as a deodoriser. It is essential that the earth be dry and sifted, and that no slops be thrown into the receptacle. The value of the earth-manure has been estimated at from £1, 10s. to £3 per ton. Of the advantages of the E.-C. S. in agricultural districts and small communities there can be but one opinion. Wherever dry earth is obtainable, and facilities exist for the ready disposal of the manure, there the system is eminently practicable. In large centres of population its adoption can scarcely be expected, especially where the water-drainage system, with all its defects, is in operation. The labour and expense of preparing and storing large quantities of earth, and of its subsequent removal, even if facilities existed for the disposal of the manure, render the system impracticable for large cities. The most zealous advocates of the E.-C. S. do not even recommend it as practicable in towns of over 10,000 persons. The system, however, has been found to work well in jails, barracks, factories, hospitals, and schools in the United Kingdom, and in prisons and military stations in India.

Modifications of the dry-earth system have also been practically tested in some English towns with successful results. For example, in the Pendleton district, under the Salford Corporation, Mr Morrell's patent cinder-sifting ash-closets, to the number of 1000 (representing a population of 5000 persons), are in daily use, and from the sale of the ash soil (at 12s. 6d. the ton) an annual profit has accrued. Morrell's method has the economic advantage over the dry-earth plan of utilising the coal-ashes which are daily produced, and as a rule the fuel refuse of a house is found to be sufficient to deodorise the whole dejecta of the family.

The Sanitary Amendment Act (31st July 1868) legalises the construction of earth-closets in place of water-closets in houses and elsewhere, subject to the approval of the local authority. See Rev. H. Moule's *Dry-Earth System* (Lond. 1871), and a pamphlet on the *Health and Sewage of Towns*, issued by the Society of Arts (Lond. May 1876).

Earth'enware, a name applied indefinitely to pottery in which the body or paste is made of the coarser and more common materials. See POTTERY.

Earth-Houses, popularly known as *eirde* or *yird houses*, and occasionally referred to by archæologists as *weems* (Gael. *uaimh*, 'a cave'), are a class of structures peculiar to the eastern parts of Scotland. They are specially abundant in Aberdeenshire (where they are sometimes called 'Picts' houses'), but they range from Shetland to Berwickshire, and are confined, with few exceptions, to the counties bordering on the E. coast. The typical earth-house may be described as an elongated chamber, solidly built of unhewn and uncemented stones, curved and pear-shaped on the ground plan, the walls converging, and the roof formed of massive flat slabs. The whole structure is subterranean, the roof reaching to within a foot or a foot and a half of the surface level. The entrance is low and narrow, often a mere hole like a fox-earth, sloping downwards, and widening as it proceeds to the level floor about ten or a dozen feet inwards. The interior is thus a long, narrow, curved chamber, extending from 20 to 40 feet in length, and widening from 3 or 4 feet near the entrance to 8 or 9 at the further end, with an average height of from 5 to 6 feet. Sometimes the narrow part of the chamber is curved first in one direction and then in another, and occasionally a smaller chamber branches off from the larger. There is usually no provision for the admission of light and air, but several have been found provided with a smoke-hole in the roof near the further end. These singular structures are usually situated in dry knolls. One in Strathdon had a paved floor, and a well-built drain underneath it. The extreme length of chamber and passage was 58 feet. It was 3½ feet wide immediately within the entrance, and 9 feet wide at the further end, while the height averaged about 6 feet. On the other hand, one at Eriboll in Sutherlandshire, which was 33 feet long, was not more than 3½ feet in greatest width, and 4½ feet high. In many cases they are accompanied by the remains of habitations above ground, probably huts of turf or

wattled work. At Kildrummy, where some forty or fifty of them occurred within a radius of 2 miles, the underground structure was usually discovered by the remains of overground enclosures, the earth of which had been excavated to the depth of a foot or 18 inches, and placed as a low bounding fence round the sunken area of 10 or 12 paces square. At Kildonan, in Sutherlandshire, two of these underground structures had their entrances within the area of hut circles. They were thus evidently underground adjuncts to the overground residences of the early tribes, probably the winter dwellings of people who lived in huts in the summer season. Many conjectures as to the age and uses of these underground structures have been hazarded without the least reference to the evidence, which seems distinct enough on both points. No stone or bronze weapons have been found in any of them. The objects that have occurred in them are querns or hand-mills, stone mortars and cups, spindlewhorls, bronze pins and rings, corroded iron implements, rude pottery, and fragments of the lustrous red ware of the Romano-British period. This lustrous red ware, with embossed figures (commonly called 'Samian ware' in this country, though it is of Gallo-Roman manufacture), has been found in three E.-H. in Forfarshire, viz., at Tealing, Fithie, and Pitcur. In two other instances, viz., at Newstead, in Roxburghshire, and Crichton Mains, in Midlothian, bevelled stones, with Roman mouldings, and squared and chiselled stones, with diagonal and diamond work of Roman character, were found built into the walls of E.-H. As a class, they seem thus to belong rather to the early historic than to the strictly pre-historic period, and they were undoubtedly in use subsequent to the time of the Roman dominion in Britain. That they were occupied as dwellings is evident from the pavement, the smoke-holes, the querns, and other domestic utensils, and the accumulation on their floors of charcoal and bones of animals, which formed the refuse of the food of their occupants. They are not more uncomfortable, or much more incommodious, than many of the caves of the N. of England, which, as Mr Boyd Dawkins has shown, have been occupied as habitations after the departure of the Romans from Britain. The best of the E.-H. give on an average a room 40 feet by 7, and 5 to 6 feet high. No structures precisely similar are known elsewhere. Several examples of a type closely analogous, however, are found in Cornwall and in Brittany. In many of the *raths* and early earthworks of Ireland there are underground structures, but they differ in form from those described above, and more nearly resemble the chambers in the larger sepulchral cairns. A double chamber of this type occurs under the area of the fortified hill of Dunsinnane in Perthshire.

Earth-Nut, or **Earth-Chestnut,** a name given to the tubers of certain plants belonging to the natural order *Umbelliferæ* (q. v.), such as the *Bunium flexuosum* and *Carum* or *B. bulbocastaneum.* The name pig-nut is given to the tubers of the latter species, on account of the fondness of pigs for these structures. These *Umbelliferæ* are harmless, and are used as esculents, like their near neighbours the parsley, celery, &c. Earth-nuts are highly esteemed in Sweden, and those of *B. ferulaceum* in Greece. The first-named species of *Bunium* is common in Britain, especially in marshy places.

Earth'quakes are sudden and more or less violent movements of the earth's surface. They are of various intensities, from a vague subterranean rumbling to a shock sufficient to set the earth into a violent undulatory motion, shattering rocks, opening chasms, destroying old lakes, or calling into existence new ones, altering, or, it may be, completely obliterating, the course of streams, submerging dry land below the sea, forming new islands, or extending the area of old territories, and all that with a suddenness and force which cannot but be attended with the overthrow of works of human construction, and the loss of much life and property.

Regarding the nature and origin of E. there has been much speculation from the earliest ages. Anaxagoras ascribed them to subterranean clouds bursting into lightning, and shaking the vaults in which they were confined; Descartes to the explosion of inflammable products in vast underground cavities; Stukeley and Priestley to electrical causes; Humboldt, Von Buch, and others to the action upon the earth's crust of waves induced in the great internal ocean of molten rock, once so generally believed in. (See EARTH.) The latest and most scientific theory, inasmuch as it explains all known phenomena, and postulates nothing but what experience shows is highly probable, is that advanced by Mr Mallet in 1858, during the meeting of the British Association at Dublin. He defines an earthquake as 'a wave or waves of elastic compression, in any direction, from verticality upwards to horizontality, in any azimuth, through the crust and surface of the earth, from any centre of impulse, or more than one, and which may be attended with sound-waves and sea-waves, depending upon the impulse, and upon circumstances of position as to sea and land.' The earth-shock originates as a ruptive force or explosion, due possibly to a sudden generation or condensation of steam in the vesicular cavities with which the slowly-cooling earth most probably abounds. This shock gives rise to a wave or a series of waves, each of which travels in a continually-increasing spheroidal shell, and therefore spreads over the surface in a correspondingly-growing circle. This circle, however, will vary considerably from the true mathematical form, inasmuch as the velocity of transmission depends upon the nature of the rock through which the shock travels, as also upon its jointed and faulted character. Experiment shows that such waves of compression travel more rapidly the more solid the rock is, and the actual rate in the Calabrian earthquake of 1857, as calculated by Mr Mallet, was an average of 789 feet per second.

The *angle of emergence* of the wave is evidently greater the nearer the locality under consideration is to the origin of the shock—being a right angle at any place in the so-called *seismic vertical*, or line drawn vertically upwards from the position of central impulse. Here, of course, the intensity will be greatest, but it will exert no overturning power. Hence the greatest damage will not be done here, but will be on a certain closed curve, at every point of which the angle of emergence will be sufficiently small, and the intensity of the shock sufficiently great, so as to render that portion of the shock resolved parallel to the surface a maximum. If the origin of the earthquake should be below the bed of the ocean, the water directly over the seismic vertical will receive a violent blow, giving rise to an oscillatory wave, which will travel in a manner similar to the true earth-shock, but at a considerably less velocity. These statements are deduced from the theory upon dynamical principles, and are fully borne out by experience. In coast districts subject to E., the ocean-wave is more dreadful in its effects than the earthquake proper. Accompanied by a turbulent sea, traceable to no common cause, and immediately preceded by an extraordinary outdraught of water, laying bare the ocean-bed to a distance sometimes far below the low-water mark, it dashes with terrific fury upon the shore, tearing up trees and shrubs by the roots, levelling houses, and other works of human construction, and carrying high and dry upon its giant crest seaweed, shells, fragments of wood, boats, and even large vessels. The origin of the rumblings heard before and after the passage of the shock is at once evident, being due to the more rapid transmission of the atmospheric waves produced at the surface of contact of the earth and air.

The most celebrated historic earthquake is undoubtedly that of Lisbon, November 1, 1755. In the brief space of eight minutes, the whole city was reduced to ruins, and 50,000 inhabitants swallowed up. Perhaps the most awe-inspiring event was the disappearance, without leaving a trace behind, of the pier, with its crowds of terror-struck fugitives. This earthquake also did incalculable damage at Coimbra, Oporto, Malaga, Fez in Morocco, where thousands of persons perished, and at the Madeira Islands. According to Humboldt, it extended over an area equal to about one-eleventh of the earth's surface, but its only effect in Scotland was the temporary alteration in level of some of our lakes. At Calabria, in Italy, there have been several destructive E. at various times, the last great one, by which about 10,000 lives were lost, occurring on December 16, 1857. The W. Indies and the volcanic regions of S. America also suffer much from time to time. In August 1868, about 25,000 perished, and 30,000 were rendered homeless in the various towns and villages of Peru and Ecuador. Britain is fortunately rarely visited, and then but slightly. The place of most frequent occurrence is Comrie in Perthshire, and this would seem to be connected in some way with its geological position, which recent survey has shown to be on the great line of fault separating the Lowlands and the Highlands. As a rule, districts subject to E. are also volcanic, a fact which is evident at a glance over a good map of the distribution of E. and volcanoes, such, for instance, as that in Keith Johnstone's *Physical Atlas*, Plate X. For cata-

logues and descriptions of E., and for more detailed information concerning the accompanying phenomena, the reader is referred to Mallet's works, to Von Hoff's *Veränderungen der Erdoberfläche* (parts ii., iv., and v.), to Lyell's *Principles of Geology* (vol. ii.), to Somerville's *Physical Geography*, to Daubeney's treatise *On Volcanoes*, and to Ponton's *E. and Volcanoes* (1872).

Earth'-Wolf, or **Aard-Vark** (*Orycteropus Capensis*), a peculiar genus of *Edentata* (q. v.), forming the type of a special family (*Orycteropidæ*), and inhabiting Southern Africa. The molar teeth number fourteen above, and twelve in the lower jaw; the incisor and canine are wanting; the front feet possess four, and the hind feet five, toes; the claws are powerful, and adapted for digging; the body is covered with hair, and averages about 5 feet in length; and the tail is of moderate size, attaining a length of 20 inches. The ears are very long and prominent. The E. lives in burrows, and is nocturnal in habits. It feeds chiefly upon ants, which it takes up by means of its long tongue and viscid saliva.

Earth'work, in engineering construction, consists chiefly of cuttings and embankments for railways, roads, reservoirs, &c. The engineer who projects and lays out a railway has the 'quantities' of E. in cubic yards, both of excavation and embankment, calculated in detail in his office; and finds, by boring or otherwise, the nature of the ground in which the cuttings have to be made, and upon which the embankments are to rest. The work is executed by a contractor, whose price is based upon the quantities and information supplied by the engineer. Before the E. of a railway is commenced, its centre line is staked and nicked out (or marked by a little trench on the surface of the ground), its levels having been previously fixed, so that the quantity of land excavated in the cuttings may be, in general, equal to the amount required for making the embankments, in order that no soil may have to be excavated specially for this purpose. This is called 'equalising E.'

The slope or nature of the soil, the nearness of water, and other causes, occasion the special difficulties which occur in the construction of E. On ground which has a 'sidelong' slope it is often necessary to form the surface into steps before tipping upon it, that there may be no tendency for the whole embankment to slide down after it is finished. Cuttings through rock may require to be blasted. Embankments exposed to the action of water may require to be pitched with dry stone, or even protected by a masonry face. Probably the greatest difficulty of all to be overcome in connection with E. is the construction of embankments upon soft and yielding soil. Various methods have been employed according to the special nature of the various situations, such as by efficient side-draining or giving an extra width to the base of the embankment, by the solidifying of the soil by throwing in ballast, by raising a structure of piles, or (as across the celebrated Chat Moss) by supporting the embankment upon a raft made of hurdles or fascines or on an intermediate layer of dry peat. In the ordinary cases, where a stone facing is not necessary, the slopes of earthworks are dressed to a good surface, covered with about 6 inches of soil, and sown with grass, which is not only sightly in itself, but prevents the destruction of the faces by weathering.

Earthworks, though they have been advocated for permanent fortifications, are chiefly met with in the field. The most ordinary form is the parapet, excavated from a ditch in front or a trench behind. The exterior slope must have the inclination which the material would assume when poured loosely from a height—for ordinary soil, 45°. The top of the parapet, for defence, ought to be horizontal, or at least parallel to the plane of site. As this, however, would interfere with the firing, it slopes gently outward from the crest (1 in 6). The inner wall, or revetment, terminates in a sloping step, or banquette, on which the defenders stand in firing. To resist musketry a parapet ought to be five feet thick; to resist 24-pounder guns, 24 feet. On level ground, the ordinary height is 7½ feet. The parapet is often erected on a wide bank of earth or rampart; this where guns are to be used. The escarp, or slope of the ditch ought to be continuous with the exterior slope of the parapet. Excavation is found to add 9 per cent. to the calculated bulk of most soils. The more complex forms of fieldworks (where the use of masonry is of course impossible) are of three classes—(1) Those open at the gorge, including the redan, a work of two faces forming a salient angle; the double redan, or *tête à queue d'hyronde*, which has, of course, a re-entering angle; the triple redan, with long flanks; the tenaille head, a low, two-faced work in the main ditch, and before the curtain; the lunette, an advance work, larger than the redan, with two faces and two flanks parallel to the capitals; bastion head, composed of several bastion fronts forming obtuse angles with each other. (2) Those enclosed all round, including the redoubt, which has no flanking defence from its own parapets, and which sometimes appears in the ravelin or outwork beyond the main ditch; and the bastion fort, the most complete enclosure, as each side or front consists of two faces, two flanks, and a curtain. (3) Those which consist of lines both continuous and at intervals, the separate works being always arranged so as to flank and defend one another, including lines of redans, lines of tenailles, or parapets forming a series of salient and re-entering angles, lines of bastion, or a succession of bastion-shaped parapets, each having two faces, two flanks, and a curtain; and indented lines *à la crémaillère*, composed of alternate short and long faces at right angles to each other. In rocky positions works are often entirely constructed of sandbags—tarred canvas bags holding about a bushel of earth. They are also placed on parapets to afford loopholes for riflemen.

Earth'worm (*Lumbricus*), a species of *Annelida* (q. v.), belonging to the order *Oligochæta*—a group distinguished by the rudimentary nature of the bristles or *setæ* on the sides of the body, so characteristic of most other worms. The E. breathes by means of the general surface of the body, assisted by little *sacculi*, or pouches of the integument. Its body is of cylindrical shape, blunt in front, and pointed behind. The E. is a hermaphrodite, the sexual organs being contained within a limited number (8-15) of segments of the body. The position of these organs is denoted by a swelling of the corresponding joints, so as to form a prominent eminence, which, from its saddle-like appearance, has been named the *clitellum*. The eggs are contained in cocoons, and are deposited in clusters, and the young are developed directly from the eggs. The mouth is not provided with teeth or jaws, and a 'crop' and 'gizzard' exist. Certain sacs, termed *segmental organs*, found in most Annelides, communicate in the E. with the internal cavity of the body, and probably possess some excretory function. The bristles fringing the body exist in two rows, and are hooked. Earthworms effect much good in soils by opening them up and separating the solidified masses of earth, thus permitting the rain to gain access to the subsoils. Their food is entirely of a vegetable nature, while they in turn form food for moles, shrews, and allied mammals, as well as for very many birds. They appear to be nocturnal in habits. Several tropical genera and species attain a large size.

Ear'-Trumpet, an instrument adapted to relieve defective hearing, by collecting and concentrating sound, and conveying it into the ear. The ordinary E.-T. takes the form of a trumpet with a wide, bell-shaped mouth, which is turned in the direction of the sound, tapered to a bent ear-piece that is placed at the entrance to the auditory passage. It is generally made of tin or ebonite, and arranged in telescopic sections for convenience of being carried about. In another form, a bell-shaped vessel has two curved pipes connected by flexible tubes to end-pieces that either enter or cover the ears. The *auricle* is a contrivance designed for the same object, and consists of a small volute, which is inserted into the ear, with an expanded mouth. In some churches and other buildings there is placed a large funnel-shaped receiver, terminating in a circular throat and conducting pipe, from which branch off as many flexible tubes with ear-pieces as may be required.

Ear'-Wax. See CERUMEN.

Ear'wig (*Forficula*), a genus of insects belonging to the Cursorial section of the order *Orthoptera* (q. v.), and forming the sub-family *Forficulina* or *Euplexoptera*, the latter name being given them from the beautiful structure of the hinder wings, which are thin, and have their *nervures* or supporting ribs so disposed that they can be folded like fans. The name suggests that these insects select the human ear as an occasional habitation. This, however, is not the case. The proper form of



Earwig.

the name is 'ear-wing,' from the resemblance of the wings to the shape of the ear. The head is exserted, and has no ocelli; the front wings are small and leathery; the antennæ have fourteen joints; and the tail ends in a pair of 'forceps,' which are used by the insects in folding their wings. The pupa is like the perfect insect, but is not winged. The eggs are deposited in the earth, and are carefully watched by the mother. These insects live on vegetable matters. Familiar species are the *F. auricularia* and the *F. gigantea*, the latter being the largest of the six or seven species indigenous to Britain.

Eas'dale, an island off the W. coast of Argyleshire, about 10 miles S.S.W. of Oban. It is only three quarters of a mile long, but is widely known for its slate-quarries, which have been worked more than a century and a half. From this cause much of E. is now below the sea-level. Pop. (1871) 504.

Eas'el (Ger. *esel*, 'ass, donkey'), the wooden frame upon which artists place their pictures while in process of being painted, at a convenient height for working on the different parts. *E.-pieces*, or *E.-pictures*, are the smaller pictures of an artist accustomed to execute works on ceilings or walls.

Ease'ment, a term of English law denoting a privilege without profit which one person may have in the property of another by charter or prescription. Rights of E. include rights of way, of light and air, and of carrying on an offensive business. The analogous term in Scotch law is Servitude (q. v.).

East (Ger. *ost*, Old Norse, *aust*, probably from the same root as 'ice,' and if so, pointing out the N. of Europe for the origin of the term) is that point of the horizon at which the sun rises at the time of the equinoxes, being on the right of a person facing N. E. is also one of the cardinal points of the compass, corresponding to the true E. at those places where the needle points due N.

East'bourne, a town in the county of Sussex, 18½ miles S.W. of Hastings. It is a favourite sea-bathing place, and has a handsome parish church. Roman and Danish remains have been found here. Pop. of parish (1871) 10,361.

East Cape, the most eastern point of the Asiatic continent, projects with a bold and lofty headland into Behring Strait, opposite Cape Prince of Wales on the continent of America. Its summit, bristling with rocky pinnacles, is the site of a large and populous Tschutski village (Hooper's *Tents of the Tuski*, Lond. 1853). The same name is applied to the easternmost promontories of various countries and islands, as those of Madagascar, New Zealand, &c.

Eas'ter, as now understood and observed, is a Church festival in commemoration of the resurrection of Jesus Christ. A famous controversy in the early Church turned upon the time of the observance of E., the bearings of which will be best understood from a reference to the Gospel narratives. According to the first three Gospels, Jesus partook of the Jewish Passover with his disciples in the usual manner on the evening of the 14th Nisan, instituting on that occasion a memorial of himself (Matt. xxvi. 17–29; Mark xiv. 12–25; Luke xxii. 7–20); so that he must have been crucified on the 15th. In the fourth Gospel, on the contrary, the Last Supper took place on the 13th, and Jesus was crucified on the 14th (xiii. 1, 29; xviii. 28; xix. 14). Now the Church at first observed the Paschal festival (Heb. *Pesach*, 'the Paschal lamb;' whence the Gr. and Lat. *pascha*, the Fr. *pâque*, and the Scotch *pasch*) on the 14th Nisan, following the first three Gospels; but soon there arose a difference between the Eastern and Western Churches on this point, which got the name of the Quartodeciman controversy. In the W. there was a tendency to attach most importance to the resurrection, and a feeling that it was incongruous to stop the preceding fast on the 14th, and make a feast of that which ought to be a day of mourning for his death (the Jews of course connected the idea of rejoicing with their Passover for other reasons). The authority of the fourth Gospel was now called in by the Western Church (curiously enough that of St John being adduced by the Eastern in support of their opposite view), to show that the Jewish Passover was completely abolished by the crucifixion of Christ on the day (14th) on which the lamb was killed, in other words, by Jesus taking the place of the lamb (cf. 1 Cor. xi. 23–26; v. 7), and that the fast ought properly to cease always on the first day of the week, to commemorate his resurrection. This feeling was further strengthened by the difficulty of adjusting the solar year to the lunar mode; and when, by the edict of Constantine (321), the *Sun-day* was consecrated as a day of rest and religious observance, the Pascha was finally transferred from the 14th Nisan to the Sunday following the full moon on or next after the vernal equinox. The vernal equinox is now fixed as the 21st March, and the rule is, that if the full moon fall on a Sunday, E. is the Sunday after.

But neither tracing the festival to the resurrection of Christ nor to the Jewish Passover is in a sense going to the root of the matter. E. was properly and originally a heathen festival, which was appropriated by the Church, and applied to the resurrection. The spring equinox was observed among the ancient nations of the East as the beginning of the new year, and among almost all nations as a season of great rejoicing in honour of the sun-god, and of his return to clothe the earth with verdure, and 'fill men's hearts with food and gladness.' He appeared then to rise triumphant over darkness and death, to bring back life and light to the world. It is impossible nowadays to realise how close was the resemblance which the rites adopted by the Church in honour of Christ's resurrection bore to those practised by the Greeks, Phœnicians, Syrians, Egyptians, and many other nations, in honour of the solar deity, under the name of Adonis, Dionysus, Thammuz, Krishna, &c. The Church continued the worship of the Queen of Heaven, condemned by the prophet Jeremiah (xliv. 17), by applying it to the Virgin Mary under the very same title. The rites connected with the death and resurrection of Adonis—in which an image was laid out by women with all the ceremony and signs of grief practised at funerals, but the next day the image was taken out of its sepulchre, as it were, and their sorrow was turned into joy—were also imitated in the dramatic representations made by the Church at E. in honour of Christ.

The name E. (Old Eng. *Eoster* and *Eastre*), according to Bede, is derived from the goddess Ostara (Old Swed. *Astargydia*, 'the goddess of love;' Old Norse, *ast*, 'love'), whose festival was held in the month of April, and the popular rites connected with the season, though now baptized into Christianity, had no doubt in many cases a heathen origin. For further illustration of this peculiar process of transformation consult art. CHRISTMAS. See Bingham's *Eccles. Ants.*, and J. J. Tayler's *The Fourth Gospel* (1870).

Easter Island, Teapy Island, or **Davis's Land,** a volcanic island in the Polynesian Archipelago, 12 miles long and 4 wide, in lat. 27° 6′ S., long. 109° 30′ W. There are many colossal stone statues of unknown origin; and a wooden tablet with curious hieroglyphics was discovered in 1869. Pop. 2000.

Easter Offerings, in England, are payable by every person in the parish sixteen years old or upwards, through the master or mistress of the family, at the rate of twopence per head.

Easter Law Term being formerly dependent on Easter Sunday, which might happen to fall on any day of the month between 22d March and 25th April, both days inclusive, the Act 1 Will. IV. c. 70 was passed to remedy the uncertainty. The term now begins on 15th April and ends on the 8th May. See TERM, LEGAL.

East India Army. This name had a very different meaning in the days of the East India Company (q. v.) from what it has now. The Company employed whatever soldiers offered themselves from any quarter—adventurers, deserters, and convicts, chiefly natives. But English officers were always employed with liberal remuneration, and ultimately regiments were raised in England. Owing to the good pay, the terms of absence, and the liberal pensions given, the East India Company's service was highly popular. In 1857, the army of the Company consisted of 45,522 Europeans, and 232,224 natives; and these were divided into three armies, connected with and named after the Presidencies of Bengal, Madras, and Bombay. It was chiefly the natives in the first of these armies that took part in the Mutiny (1858). The Act of Parliament which in 1858 transferred the government of India to the crown directed that these armies should be deemed Indian military forces of her Majesty, and should be 'entitled to the like pay, pensions, allowances, and privileges, and the like advantages as regards promotion and otherwise, as if they had continued in the service of the said

Company.' The transfer was the cause of considerable dissatisfaction among the British troops, who maintained that they should have been consulted, or at least have obtained a bonus on re-enlisting; and ultimately those of them who chose were permitted to retire. By the legislation of 1861 and subsequent years, the Indian army has been reorganised. Its duty is now to take service either at home or in the colonies, although its expenses are defrayed out of the Indian revenue. The native portion of it had been reduced in 1874 to 123,678 men. In the army estimates for 1875-76 the strength of the British forces in India is placed at 62,850 men. The British and Indian troops in the Queen's pay are distinct from those in the pay of the native chiefs, which in 1874 numbered 315,000.

East India Company, the greatest corporation the world has ever known, and the association of merchants which founded the British Empire in India. The Portuguese anticipated England in opening direct commercial relations with the East. Vasco de Gama discovered the sea-road to India in 1497, and it was more than a century before his countrymen were deprived of their monopoly. The first charter of the English Company is dated 31st December 1600. Akbar was the Great Mogul with whom the English merchants opened relations. The original English Company had only 125 shareholders, and a capital of £70,000, but in 1612 the capital was raised to £400,000; and about the same time permission was obtained from the Emperor Shah Jehan to erect factories at Surat, Ahmedabad, Cambay, and Gogo. The first voyages were to Surat and to other places on the Malabar coast, but the richest cargoes were brought from the Spice Islands of Java, Sumatra, &c. From this quarter the English were soon driven by the perseverance of the Dutch, who secured their monopoly by the massacre of Amboyna in 1622. But the Company steadily progressed during the 17th c. The profits were not excessive, but the honour of the English name was uniformly maintained. In 1626, a factory was established on the Coromandel coast, at Masulipatam; and in 1639, Fort St George, now the citadel of Madras, was built on a narrow strip of land, ceded by a local prince. This was the first territorial acquisition on the mainland of India. In 1634, the wealth of Bengal was opened to the Company by permission to trade at Pipli, now a silted-up port of Orissa; in 1645, the English were established at Balasore and Hooghly, where their European rivals had long preceded them; but it was not till 1700 that the ground on which Calcutta stands was granted by the Nabob of Bengal. In 1661, the island of Bombay formed part of the dowry which Catherine of Portugal brought to her husband, Charles II. In 1668 the King made it over to the Company, and in 1687 Bombay was recognised as the chief English settlement in India. Such was the origin of the three great presidencies.

The 18th c. forms a second epoch in the history of the E. I. C. In 1702, a new Company for trade with the East, with a capital of £2,000,000, was amalgamated with the E. I. C., under the title of 'The United Company of Merchants trading to the E. Indies,' with the privilege to trade to all places E. of the Cape of Good Hope to the Strait of Magellan, on condition of a loan to the state of £3,190,000 at 3 per cent. interest. This sum was independent of the trading stock of the Company, which about this time paid an average of 8 per cent. Hostilities with the French led, almost insensibly, to the growth of the Company as a great territorial power. In 1765 the financial administration of Bengal, Behar, and Orissa was ceded to the Company by the Mogul Emperor, Shah Alum, but British power in Madras was not firmly secured till the fall of Tippoo Sultan in 1799, and the Bombay Presidency acquired most of its territory in the beginning of the 19th c. Meanwhile, restrictions were occasionally laid upon the amount of the Company's dividends by the legislature; committees of the House of Commons made searching investigations into its affairs; and in 1773 an Act was passed reorganising the corporation in Leadenhall Street, and establishing a new government for India. The Court of Directors was to be composed of twenty-four persons, and the amount of stock qualifying a proprietor for a vote was raised from £500 to £1000. The Presidency of Bengal was made supreme over the other two, and the nomination of the governor was subjected to the approval of the crown. A supreme Court of Justice was established at Calcutta, of which the judges were also to be nominated by the crown. In 1784, the Coalition Ministry of Fox was ejected from power, owing to the defeat in the Lords of his India Bill, which was intended to vest the whole management of Indian affairs in the hands of seven government nominees of the parliamentary majority. In 1784, however, a new bill was passed which first established 'The Board of Control,' consisting of six persons appointed by the crown, before whom the Court of Directors were bound to lay all important documents for approval or alteration. Mr Dundas, afterwards Viscount Melville, was the first President of this Board. In this capacity he carried a fresh Act of Parliament in 1794, by which the monopoly of exclusive trade was extended for a further period of twenty years, subject to the annual payment of £500,000 to the state; while certain small privileges were for the first time granted to private traders. At this time, the yearly sales of the Company's goods in England amounted to about £10,000,000 sterling.

The 19th c. has witnessed the extension of British rule or British influence over the whole of India, and also the final downfall of the E. I. C. In 1833, the trading monopoly was withdrawn, and with it fell all the manufactures of India which had been artificially maintained by the Company. The dividends to the proprietors of E. India stock were now paid out of the taxes on the native subjects of the Company; but it was explicitly declared that the E. I. C. exercised its political powers as trustee for the crown, subordinate to the Board of Control. In 1853 the charter was renewed for twenty years, but the Mutiny in 1857 produced an irresistible current of public opinion in England in favour of abolishing the shadow of power and the substance of patronage which the Company still retained. Despite the strenuous opposition of the Company, the Act received the royal assent on 2d August 1858, which vested directly in the Queen all the powers exercised by the E. I. C. The political affairs of British India are now managed by a minister and council of fifteen members. Indian stock to the amount of £6,000,000, with interest at 10½ per cent. guaranteed by England, represented the capital of the Company until 1873, when an Act of Parliament was passed for its final absorption. See India, British.

The Scottish E. I. C. was formed in 1695, but was almost still-born in the rapidity of its failure. That of Denmark, founded in 1618, was repeatedly reorganised (finally in 1792), but has long ceased to exist. The French Company, established in 1664, was dissolved in 1790, while the Ostend India Company only lasted from 1718 to 1731. The original Dutch Company dates from 1595, but several similar bodies were united into one in 1602. A company of Swedes was created in 1741, and reorganised in 1806.

East Indies, the name vaguely given in the 17th c. to that tract of country, with all its islands and peninsulas, which lies between the coast of Persia and the coast of China. It came into use to mark the imaginary correlation with the West Indian Islands, which, as is well known, were thought by their first discoverers to be connected with India; but the name now survives only in such phrases as 'East Indiaman,' for a ship trading to those parts, and the 'Honourable East India Company' (H. E. I. C.).

East'lake, Sir Charles Lock, an English historical painter, was born at Plymouth, November 17, 1793. He was educated at Charterhouse, London, and at an early age became a pupil of the Royal Academy. When Napoleon arrived at Plymouth in the *Bellerophon*, E. made a study of him standing at the gangway, and produced the last portrait of him painted in Europe. He visited Italy in 1817, and Greece in 1819, and spent nine years (1820-29) in Rome, revelling in the picturesque aspects of Italian life. His first great picture is entitled 'Pilgrims Arriving in Sight of Rome' (1828), and it was followed by 'Christ Weeping over Jerusalem' (1841), 'Helena' (1849), 'Violante' (1853), 'Beatrice' (1855), &c. He was made a Royal Academician in 1830, President of the Royal Academy in 1850, and D.C.L. of Oxford in 1853. E. died December 23, 1865, at Florence. He wrote *Materials for the History of Oil-Painting*, *Contributions to the Literature of the Fine Arts*, and translations of Goethe's *Farbenlehre* and Kugler's *History of Painting*. His work is chiefly distinguished by elevation of sentiment and delicacy of execution.—**Lady E.** (Elizabeth Rigby), also an artist and author, has written a biography of her husband in the second series of his *Contributions to the Literature of the Fine Arts* (1870).

East'on, a town of Pennsylvania, U.S., at the confluence of the Delaware with the Lehigh, 60 miles N.W. of Philadelphia, and 75 W. of New York by railway. It is the seat of Lafayette College, has many churches, a public library, an opera-house, several newspapers, and three street railways. In the vicinity are rolling-mills, furnaces, and various factories, and there is also a trade in cotton, oil, rifles, and flour. Pop. (1870) 10,987.

East'port, a port of entry in Maine, U.S., on Moose Island, Passamaquoddy Bay, is the frontier town of the United States on the N.E. It has a harbour deep enough for the largest vessels, and defended by Fort Sullivan, and a trade in fish and timber. Steamers ply hence to Boston, Portland, and St John. Pop. (1870) 3736.

East River, the strait between Long Island Sound and New York Bay, and separating the city of New York from Brooklyn and Williamsburg. It is 20 miles long, and 7 miles from New York is the strait known as Hellgate. This pass was formerly dangerous, but its obstructions have been removed within the last few years. A bridge is now in course of construction across the E. R. to connect New York with Brooklyn. For miles the banks of the river are lined with quays, piers, and building-slips.

Eau de Cologne, a very celebrated perfume, invented by Johann Maria Farina of Cologne, the characteristic ingredients of which are essential oils obtained from trees of the orange tribe, such as citron, orange, bergamot, neroli, and petitgrain oils. In addition to these the 'original E. de C.' contains a proportion of lavender, rosemary, and benzoin, the whole being mixed with spirit of wine, to which an alcoholic extract of geranium flowers is added. The ingredients are very intimately mixed by frequent agitation, and allowed to settle in bulk for sixty-four days, when the perfume is ready to put up in flasks for sale. The best brands are those of the inventor.

Eau de Créole, a W. Indian aromatic liqueur, prepared by distilling the flowers of the Mammee apple or S. American apricot (*Mammea Americana*).

Eau de Javelle, a solution of potassium hypochlorite which, towards the end of last century, was introduced for bleaching purposes at Javelle in France. It was soon supplanted by the so-called chloride of lime, or ordinary bleaching-powder.

Eau de Luce, a milky-white perfume of ammonia, benzoin, otto of lavender, and oil of amber. The *Aqua Luciæ* of druggists, so called from its inventor, had formerly a fictitious reputation as an antidote to snake-poison, but is now employed as a stimulant.

Eau de Millefleurs, a very complex bouquet or prepared perfume, in which the principal materials are otto of rose, bergamot oil, vanilla, violet, and jasmine essences, tincture of musk, lavender, neroli, and clove oils.

Eau de Vie. See BRANDY.

Eaux Bonnes ('good waters'), a favourite watering-place in the department of Basses-Pyrénées, France, 22 miles S. of Pau. Its warm sulphur-springs are beneficial in the early stages of consumption, and have led to the creation of a thermal establishment, frequented yearly by 6000 bathers. Resident pop. 674. In the vicinity are beautiful promenades and picturesque cascades.

Eaux Chaudes, a village of France, 3 miles S.W. of Eaux Bonnes, in the gorge of the valley of Ossau, has warm medicinal springs, whence its name.

Eaux Vives ('living waters'), a Swiss town in the canton of Geneva, 2 miles N.E. of Geneva, and on the margin of the lake. Pop. (1870) 5875.

Eaves'drop. The Roman law required a proprietor who had no *stillicidii servitus*, to place his building 2½ feet within his boundary. The principle was recognised by the English before the Norman conquest under the term *efesdrype*. In Scotland there is no statute on the subject, but by custom 9 inches are required for the E.; but a proprietor may build to the confines of his property provided no drop from the building can fall on the adjoining property.

Eaves'droppers are, according to Blackstone, 'such as listen under walls or windows or the eaves of houses, to hearken after discourse, and thereupon to frame slanderous or mischievous tales.' The offence is in England punishable by fine, under statutes whose provisions seem to be extended to Scotland by 6 Anne c. 6; but the offence could be reached directly and indirectly by the common law of Scotland.

Ebena'ceæ, a natural order of Exogenous (*Epipetalous*) plants, comprising trees or shrubs with exstipulate leaves, polygamous flowers, persistent calices, a baccate or berry fruit, and large albuminous seeds. They chiefly belong to tropical climates. There are five genera, and the heart-wood of several species of *Diospyros* yields the ebony-wood of commerce, *e.g.*, Mauritius ebony (*D. reticulata*), E. Indian ebony (*D. melanoxylon*), and Ceylon ebony (*D. Ebenum*).

E'berhard is the name of several members of the Würtemberg dynasty, of whom the first, **Eberhard the Noble** (*erlauchte*), ruled from 1279 to 1325, and greatly extended the territorial possessions.—**Eberhard IV., the Quarrelsome** (*der Greiner*), grandson of the former, became Count of Würtemburg in 1343, distinguished himself in the wars of S. Germany towards the end of the 14th c., and died March 15, 1392.—**Eberhard im Bart**, first Duke of Würtemburg, was born in 1445, eight years after the division of the territory between his father, Ludwig the Elder, and his uncle, Ulrich, the founder of the Stuttgart line. He succeeded, with the help of the Elector Friedrich, in consolidating the family inheritance, which he rendered indivisible by the Compact of Münsingen in 1482. The established constitution of Würtemburg is his work, and he also founded the University of Tübingen (1477). E. was the head of the Swabian Bund, and was raised to the ducal rank by the Emperor Maximilian I. at Worms, 1495. He died childless in February 1496. See Pfister, *Eberhard im Bart, erster Herzog in Würtemburg* (Tüb. 1822).

Eberhard, Christian August Gottlob, a German writer, born at Belzig, Prussia, October 11, 1769, studied at Halle, wrote tales and poems which won considerable popularity, and died at Dresden, May 13, 1845. Among his works are *Ferdinand Werner, der arme Flotenspieler* (1802); *Der erste Mensch und die Erde* (1828), a poem; and *Hannchen und die Küchlein* (1822; 20th ed. 1864), a graceful narrative poem, which has been translated into English by Cochrane, under the title of *Jenny and her Chickens* (Edinb. 1854). E. published his *Collected Works* in 20 vols. (Halle, 1830-31).—**Johann August E.**, a philosophical writer, born at Halberstadt, Saxony, August 31, 1739. After studying at Halle and acting as a family tutor, he engaged in theological controversy, and published at Berlin his *Neue Apologie des Sokrates* (1772-73; 3d ed. 1788), a book on the salvation of the heathen, which prevented him from rising in the Church. He remained a poor preacher at Charlottenburg until appointed in 1788 Professor of Theology at Halle. He was made Doctor of Theology and Member of the Berlin Academy of Sciences in 1808, and died 6th January 1809. In philosophy he followed Leibnitz and opposed Kant; in theology he was one of the earlier German rationalists. Among his many works are *Geist des Urchristenthums* (1808); *Theorie des Denkens und Empfindens* (1786); *Sittenlehre der Vernunft* (1781); *Allgemeine Geschichte der Philosophie* (1788); *Handbuch der Aesthetik* (1803-1805); and *Synonymisches Handwörterbuch der Deutschen Sprache* (Halle, 1802; 12th ed. Berl. 1861).

E'bernburg, a village in the Palatinate of Bavaria, about 20 miles S.W. of Mainz, on the Nahe. It is notable for the ruins of the castle of Franz von Sickingen. Within its walls many of the early Reformers found shelter, and here Ulrich von Hutten composed and printed several of his works. Pop. 550.

E'bert, Karl Egon, a Bohemian dramatic and lyrical poet of considerable eminence and popularity, was born at Prague, June 5, 1801; educated at Vienna and the University of Prague, and finally, after holding posts, chiefly as a librarian, settled in his native town as a poet. His poetry, mainly lyrical, is very popular among his countrymen. Among his works are *Dichtungen* (1824; 2d ed. 1845); *Wlasta, ein Böhmisch-nationales Heldengedicht* (1829); and *Das Kloster, idyllische Erzählung* (1833). He has also published dramas of some merit, including *Bretislau und Jutta* (1835), and *Das Gelübde* (1864).

Eb'ionites (Heb. 'the poor:' so named, according to their own account in Epiphanius, because they had sold their possessions for the common good in the time of the apostles) were a sect in the early Church who represented the Judaising tendency which saw in Christianity only the completion of Judaism by

the realisation of the Messianic idea and the addition of a few isolated precepts. The E. regarded Jesus only as a man, distinguished above others for his legal piety, on which account he had been deemed worthy to be chosen the Messiah; his election to that office having been miraculously revealed at his baptism by John the Baptist. Jerusalem was still to be the seat of the theocracy, where Jesus, on his speedy return, was to restore it in surpassing splendour. In accordance with these views, the Gospel they used (the *Gospel of the Hebrews*) did not contain any account of the miraculous birth of Christ. In the Apostle Paul, as a matter of course, they saw only an apostate from the law and a false teacher, and therefore they rejected his epistles. The famous *Clementine Homilies* (q. v.) is an Ebionitish work.

There were, however, two different sections of E., one of which came nearer than the other to the orthodox doctrine of the Church. This was the Nazarites, a name originally applied to all Christians, who admitted the supernatural birth of Christ; they were distinguished for their opposition to the Scribes and Pharisees, acknowledged the call of Paul to be an Apostle to the Gentiles, and consequently did not consider the Mosaic law binding on the latter. See Neander's *Kirchengeschichte*, F. C. Baur's *Paulus der Apostel* (2d ed. Zeller, Leips. 1867; Eng. transl. Lond. 1873).

Eb'oli (the *Eburi* of Pliny), a town in the province of Salerno, 44 miles S.E. of Naples, with which it is connected by railway. It has several churches and convents, and an annual fair, held for twelve days. Pop. 7300. The ruins of the ancient *Eburi* stand on the *Monte d'Oro*, near the Sele, which is spanned by the remains of a fine Roman bridge.

Eb'ony (Heb. *hobnim*. from *eben*, 'a stone,' Gr. *ebenos*, Lat. *ebenus*), a wood of great hardness and of deep-black hue, obtained from various kinds of trees belonging to the natural order *Ebenaceæ* (q. v.). The E.-wood is the *heart-wood* of these trees, which belong to the genus *Diospyros*. *D. Ebenum* of Mauritius and Ceylon affords the best E. This tree may attain a large size, and the heart-wood of the stem may of itself form logs over two feet in diameter, and often above ten feet in length. E.-wood, when felled, is usually immersed in water for periods varying from six to eighteen months, to further harden it. It is then taken out, the ends of the logs being prevented from splitting by being girt with iron rings. The wood is mostly used for inlaying and in turning, and was employed by the ancients. Other kinds of commercial E. may be obtained from Leguminous plants, such as *Brya Ebenus* of America.

Ebrios'itas. See DELIRIUM TREMENS.

E'bro (Lat. *Iberus*), a river of Spain, which has its source in the Cantabrian mountains, in the province of Santander, and flows S.E. through Navarre and Aragon, passing Logroño, Tudela, and Saragossa, and falls into the Mediterranean below Tortosa, after a course of upwards of 400 miles, much of which is impeded by shoals and rapids. As its mouth is sanded up, a canal, the *San Carlos*, has been cut through the delta from Amposta to the Bay of Los Alfaques; and another, connected with the San Carlos and reaching as far inland as Saragossa, is nearly completed. Besides these there is the famous *Imperial Canal*, or canal of Aragon, commenced by Karl V., which begins 3 miles below Tudela, and ends at the monastery of Monte Terero, near Saragossa. The E. drains a basin of upwards of 25,000 sq. miles. Principal affluents on the left—the Aragon, Gallego, Segre; on the right, Xalon and Guadalope.

Ecbal'ium Officinar'um (*E. agreste; Momordica elaterium*; Fr. *concombre sauvage*), commonly called the squirting cucumber, an annual plant of the natural order *Cucurbitaceæ*, is a native of the hotter parts of Europe, where it grows wild on rubbish-heaps. It is cultivated as a medicinal plant in some parts of Northern Europe, and a few acres are grown at Mitcham, in Surrey. It is a trailing plant, without tendrils, rough, and covered with stiff hairs. The fruit, like a small oblong melon, is covered with soft prickles, and is filled with a succulent tissue containing numerous black seeds, which, when the fruit is ripe, are forcibly expelled through the aperture where the stalk is attached to the fruit. This remarkable phenomenon is ascribed by Dutrochet to osmotic action within the fruit. The active principle of the plant is contained in the thick green mucus surrounding the seeds, from which is prepared the drug *Elaterium* (q. v.).

Ecbat'ana (Old Per. *Hagmatana*, and Old Testament *Achmetha*, probably 'treasure city,' Gr. *Engbatana* and *Ecbatana*), an ancient city of Media, which has been identified with the modern Hamadan (q. v.). E. was the summer residence of the Median, Persian, and Parthian kings, was built on a conical hill, and surrounded by seven separate walls, painted different colours, the outmost of which had a circumference of fully 28 miles. A recent theory is that there were two Ecbatanas, one at the modern Hamadan, the other at Takht-i-Suleiman, in the province of Azerbijan.

Ec'ce Hom'o (Lat. 'behold the man'), the exclamation of Pilate when he brought Christ forth bound and 'wearing the crown of thorns and the purple robe' (John xix. 5). The expression was adopted by the old masters as the title of pictures representing the Saviour thus presented to the Jews by Pilate. The greatest E. H. is that of Correggio, in the National Gallery. Guido, Morales, and other famous painters, have also treated the subject.

Eccen'tric, in machinery, a disc fixed eccentrically upon a revolving shaft, and used to transform its rotary motion into a reciprocating (approximately harmonic) one, in cases where the continuity of the shaft cannot be broken by a crank.

Eccentri'city, the name of an important element in central curves and surfaces of revolution of the second degree, being the ratio of the distance between the foci to the major axis. It is, therefore, less than unity for the Ellipse (q. v.), and greater than unity for the Hyperbola (q. v.), being equal in the former case to $\sqrt{(a^2-b^2)} : a$, and in the latter to $\sqrt{(a^2+b^2)} : a$, where a and b are the major and minor axes respectively.

Ecchymo'sis (from Gr. *ek*, 'out of,' and *chymos*, 'juice'), a discoloration of the skin caused by the extravasation of blood in the skin or the tissues beneath it. E. is usually attended with swelling, and may be caused by disease, accidents, or injuries. E can only take place during life, or before the vital functions have entirely ceased, so that its presence is an important condition in many cases of medical jurisprudence. E. may be diminished by the application of cold, in the case of recently-inflicted injuries.

Ec'cles (a corruption of the Lat. *ecclesia*), a word that enters into the composition of a great number of names of places, as Eccleshall, Eccleshill, Eccleston, Ecclescraig, Ecclefechan ('the church of St Fechan'), Ecclesmachan ('the church of St Machan'), &c. The most important, however, is *Ecclesfield*, a town in the W. Riding of York, with manufactures of flax, linen, and cutlery. Pop. of township (1871) 15,171.

Ecclesias'tes (Gr. in the LXX. for Heb. *koheleth*, 'the preacher') is the title of one of the books of the Old Testament, which professes to be the utterances of the 'Preacher, the son of David, king of Jerusalem,' *i.e.*, Solomon (ch. i. 1, cf. 12). That it was the composition of Solomon was in ancient times the universal opinion, but there is now a very general opinion that the author's assumption of Solomon's name is nothing but a literary embellishment, the propriety of which would lie in Solomon's reputation for wisdom, and his ability to testify from experience of the vanity of all earthly things. Incidental indications that it was not written by Solomon are found in ch. i. 12, 16; ch. ii. 9 (unsuitable to the son of David, the only king before him in Jerusalem); ch. iii. 16; ch. iv. 1 (it is unlikely that Solomon would have described the misery and wrong caused by his own misgovernment); and ch. xii. 9-14.

As to the actual date of its composition, there are thought to be a number of indications that it was written after the Captivity:—(1) The whole nature of the language, and the prosaic character of the composition; (2) the profusion of Chaldaisms, scarcely found in any of the other books of the Old Testament; (3) the complaint about much book-making (ch. xii. 12); (4) sundry allusions to oppressive *foreign* kings then ruling (iv. 13-16; x. 16, 17, 20).

Regarding the plan of the book there has been the greatest diversity of opinion. Perhaps the most matured view is that while the book contains the germs of both the Pharisaic and Sadducaic systems, the object of the writer was to point out that the secret of true happiness, amid all the troubles of the world, consists in a true enjoyment of the good that comes from God.

See Bleek's *Einleitung in das Alt. Test.* (2d ed. Berl. 1865; Eng. trans. 1869); Ginsburg's *Ecclesiastes* (1861); and Tyler's *Ecclesiastes* (1875).

Ecclesias'tical Commiss'ioners for England were established by the Acts 6 and 7 Will. IV. c. 77 and 3 and 4 Vict. c. 113, in order to carry out the recommendations of two commissions appointed in 1835 to consider the state of the several dioceses in England and Wales, with reference to the amount of their revenues, and the more equal distribution of episcopal duties, the prevention of the necessity of attaching by commendam to bishoprics benefices with cure of souls; to consider also the cathedral and collegiate churches and the residence of clergy on their benefices. The Commission recommended such exchange of episcopal duties as would prevent translations and commendams, and the appropriation of part of the corporate revenues of the cathedral and collegiate churches, and of the whole endowments of the non-residentiary prebends, dignities, and offices, to establish a fund for the better provision of the cure for souls. Under the second Act, the composition of the body was materially changed: it now includes all bishops, the three chief deans, and six judges *ex officiis*, the crown and the primate getting power to appoint four and two lay commissioners respectively, in addition to three originally appointed. By 13 and 14 Vict. c. 94, three salaried Church Estates Commissioners were appointed to control the purchase, exchange, letting, or management of lands and tithes. The method of procedure is for the Commissioners to lay a scheme before the Queen in Council, the Order in Council being afterwards registered in the diocese affected by it. But under the Ecclesiastical Leasing Acts, and in the later Acts relating to clerical residences and the spiritual provision for populous places, the Commissioners act independently. The Act first mentioned made very extensive changes in the limits of the episcopal sees, and introduced two new sees, Manchester and Ripon; it laid down the principle that all parishes should be subject to the episcopal jurisdiction in which they are locally situate, and re-arranged salaries, first-fruits, and tenths. Under the Act 23 and 24 Vict. c. 142, the lands and emoluments (except rights of patronage, residences, and lands connected therewith) of the various sees are vested in the Commissioners, subject to an obligation to provide what is an adequate endowment from time to time. The second-mentioned Act, 3 and 4 Vict. c. 113, has been largely extended by 4 and 5 Vict. c. 39 and 31 and 32 Vict. c. 114. These Acts dealt with the abolition of sinecures, pluralities of deans, and non-residentiary cathedral preferments, chiefly canonries, and the raising money for the cure of souls by the annexation of parishes to canonries, and of canonries to archdeaconries. The separate estates of deaneries and canonries, not suspended or annexed, and of non-residentiary prebends, are also vested in the Commissioners; and by 27 and 28 Vict. c. 70 any corporation of vicars choral, priest or senior vicars, custos and vicars, warden and minor canons, &c., may transfer their lands to the Commissioners. The policy of the Commissioners is expressed in certain resolutions submitted to the Queen. Unconditional grants to augment income and provide residences are given where population is 2000 and income below £150, but only where the patronage is public. They are now advancing to districts having populations of 4000 and incomes under £300. The Commissioners also superintend the exchange of advowsons, the sale of livings in the gift of municipal bodies and of the Lord Chancellor, the erection of new parishes and the selection of sites for building. In fact, under 19 and 20 Vict. c. 55, the Commissioners have become the Church Building Commissioners, originally appointed in 1818 to distribute £1,000,000 in the erection of new churches. From the Commissioners' Report, 25th February 1875, we find that in the preceding year they paid £421,677 for augmentation and endowment of benefices, £10,578 for chancel repairs, £84,143 to bishops in respect of estates vested in or managed by the Commissioners, £146,792 to chapters and vicars choral, £90,948 in capital sums for parsonage houses, £50,628 for farm buildings and other improvements, and for legal, surveying, and actuarial expenses the large sum of £33,000. The rental of lands amounts to £706,668. The balance sheet shows £3,891,596 in Government securities, and £2,723,260 in cash.

Ecclesiastical Corpora'tion in England may be *aggregate* or *sole*. The former consists of several members, and is maintained by succession. The latter consists of one person; every holder of a benefice being regarded as a corporation *sole*, so that the temporalities vested in him do not descend to his heirs, as they otherwise would do by common law. The legal powers of an incumbent are nearly the same as those of a Tenant for Life (q. v.).

Ecclesiastical Courts are courts having jurisdiction in spiritual affairs. The principal ecclesiastical court of the province of Canterbury is the Court of Arches. The thirteen parishes which are *peculiars* of the archbishop are under the jurisdiction of the judge of this court. The Court of Peculiars is a branch of the Court of Arches, and has jurisdiction over the parishes of the province of Canterbury in other dioceses. The Courts of Peculiars are numerous; and those with the diocesan courts and the courts of the province of York form the ecclesiastical administration of England. Formerly these courts had jurisdiction in testamentary and matrimonial affairs, but in 1857 this jurisdiction was transferred in the former matters to the Probate Court (q. v.), and in the latter to the Divorce and Matrimonial Court (q. v.).

Ecclesiastical Law. See CANON LAW.

Ecclesiastical Titles Act. After the Reformation in England successive Tudor monarchs were excommunicated by the Pope, and, on the other hand, severe statutes were passed by Elizabeth, according to which the attributing by act or speech any such authority or jurisdiction to the Bishop of Rome as he had heretofore claimed should be punishable with præmunire. From that time to 1848 there was no legal method of communication on public matters between England and Rome, although many millions of British subjects were Catholic. In 1827, Mr Canning, as Foreign Secretary, was forbidden even to reply to a civil letter sent by the Pope announcing his succession. In 1848 the Act 11 and 12 Vict. c. 108 at last enabled her Majesty to hold diplomatic intercourse with the Pope. But it was forbidden to receive as diplomatic representative any person in holy orders in the Catholic Church, or a member of any community bound by monastic or religious vows. The Act was not made use of. After the death of Watson (the last of the old Catholic bishops) in 1584, the Pope maintained his spiritual authority in England through archipresbyters (Blackwell, Birkhead, and Harrison) until 1623, when a Bishop of Chalcedon, *in partibus*, was sent by special bull. Subsequently vicars apostolic were sent. The number fixed by Innocent XI. in 1688 was four, increased in 1840 to eight by Pope Gregory XVI., there being bishops *in partibus* as coadjutors. In Ireland the Catholic Church was always governed by ordinary bishops. In 1850 Pius IX. resolved that there should be a new division of dioceses in England, that there should be an archbishop of Westminster, and that the ordinary bishops should take their names from English towns. Wiseman, previously Bishop of Melipotamus, was made cardinal, and became first archbishop. This was done by the Bull 'Quibus Hierarchia Episcopalis in Anglia restituitur,' which was promulgated without authority from the English Government. This, and the Pastoral Letter of the new archbishop, produced a manifesto from the English clergy (see *Guardian*, April 2, 1851), in which they set forth the substantial identity and Catholicity of their Church before and after the Reformation. One title in the bull (St David's) was already appropriated to an English bishop. Earl Russell then (November 4, 1850) wrote his famous Durham Letter; he was excited by the spread of Tractarianism, or Newmania, and called the bull 'insolent and insidious.' This raised a storm in the country. The result was the Act 14 and 15 Vict. c. 60, which declared the bull void, and imposed a penalty of £100 on all persons procuring, publishing, or using such bulls, or assuming the objectionable title. This Act no one has ever attempted to enforce. On the disestablishment of the Irish Church it was found to apply to the Anglican Irish bishops, and was repealed in 1871. Scotland was for some time after the Reformation under the authority of the English archpriests and vicars apostolic, but in 1629 Urban VIII. granted faculties to F. W. Ogilvie as prefect of the mission. In 1653 the secular clergy were, by decree of propaganda, erected into a missionary body. In 1731 Scotland (which had now its own vicars apostolic) was divided into a Lowland and Highland vicariate. The present tripartite arrangement dates from 1827.

Ecclesiastical Year. See YEAR.

Ecclesias'ticus [so called because the most important and popular of the *libri ecclesiastici* (as opposed to *canonici*), or books appointed to be read in church, though not canonical] is the Latin title of the Apocryphal book called in the LXX. 'The Wisdom of Jesus the Son of Sirach.' The book seems to have been originally written in Hebrew, with the title 'The Proverbs of Jesus, Son of Sira;' of the original, however, nothing now remains but sundry quotations in the Talmud and Midrashim. The Greek version in the LXX. was made, according to the prologue, by the grandson (name unknown) of the author, in Egypt, in the reign of Euergetes. But this may have been either Ptolemy III. (B.C. 247–222) or Ptolemy VII. B.C. 145–116), both of whom received the name Euergetes. Unfortunately the same ambiguity attaches to the high priest Simon described in chap. l. as if he had but recently died, as there were two high priests of that name, one who held office about B.C. 370–300, the other about 217–195. But the laudatory description is infinitely more applicable to the former, who was surnamed 'the Pious,' than to the latter, about whom Josephus has not a single good thing to tell. Now as the Simon referred to was dead, E. was probably written about 290–280, and the Greek translation made about 247–222. The aim of the book is to set forth the true nature of wisdom, and the religious and moral duties she teaches us to follow. See Ginsburg in Kitto's *Cyclo. of Bib. Lit.* (Edinb. 1863).

Ecclesiol'ogy is a term which was invented at Cambridge at the time of the Tractarian revival of theology at Oxford. The Camden Society, which was instituted in 1838 for the study and preservation of ecclesiastical antiquities, received latterly the name of the Ecclesiological Society. The science, which may be regarded as synonymous with Sacred Archæology, treats of—I. The arts, including architecture, sculpture, painting, engraving, and music; also furniture, plate, vestments, &c. II. Practices, ritual, symbolism, tradition, customs—1. The orders of the clergy. 2. Dignities, offices, and ministries of the Church. 3. Religious buildings, communities, and rules. 4. Distinctions among Christians, as catechumens, &c. 5. Divine service, rites, and ceremonies. 6. Discipline and ordinances. 7. Sundays, fasts, and festivals. 8. Usages and institutions. See Walcott's *Sacred Archæology* (Lond. 1868).

Ecg'berht (mod. *Egbert*), one of the greatest of the early English kings, was the son of Alckmund, ruler of Kent. Claiming the throne of Wessex in 787, he was compelled to flee before Brihtric, a stronger competitor, to the court of Karl the Great, with whom he remained studying the arts of war and of government until 800, when the witenagemot of Wessex chose him as king. At this time the 'Heptarchy' had become merged into the kingdoms of Mercia, Northumbria, and Wessex; and Mercia, under the energetic Offa, had reduced to dependence, and threatened to absorb, the two remaining divisions. But after consolidating his authority during nine years of peace, and subduing the Britons of Devon and Cornwall, E. joined the E. Anglians, who had revolted against Beornwulf of Mercia, and shattered the Mercian power in the battle of Ellandun, in 823. In 827–828 he marched into Mercia and Northumbria, compelled them to acknowledge the overlordship of Wessex, and received the submission of the Welsh. Thenceforth he reigned over the country from the Forth to the English Channel, with the title 'King of the English.' The Danes began to invade England towards the close of his reign. In 833 he suffered defeat from them at Charmouth, but won a victory over them and their allies, the southern Britons, at Hengestendun (Hengstone Hill) in 835. E. died in 836. He was an able, courageous, and aspiring ruler, and may, to a large extent, be considered the founder of the English monarchy. See Freeman's *History of the Norman Conquest*, vol. i.; Palgrave's *Anglo-Saxons;* Green's *History of the English People* (1875).

Ech'ard, Laurence, an English historian, was born at Cassam, Suffolk, about 1671; held two livings in Lincolnshire; became archdeacon of Stowe in 1712; was presented to several benefices in Suffolk; and died August 16, 1730. His chief works are *General Ecclesiastical History* (1702); *History of England* (1707–18); *A Gazetteer; A Description of Ireland,* &c.

Ech'elon (Fr. *échelle*, Old Fr. *eschele*, Prov. *escala*, Lat. *scala*, 'ladder'), a formation of troops in successive parallel divisions, each stationed so far to the right or left of the preceding division, as that, on advancing, it shall be in the same line with it. In this formation the different divisions have the same local relation to each other as the steps of an obliquely-placed ladder or a staircase. This formation was of considerable tactical value in former times for the different evolutions required in attack direct or oblique or in retreat. In modern tactics, in which the grouping of men in close formation for attack would, under all but the most exceptional circumstances, prove a fatal mistake, the E., as a formation in actual warfare, is no longer in use. See DRILL.

Echid'na, in natural history, a genus of quadrupeds belonging to the order *Monotremata*, and found only in extra-tropical Australia. Two species (*E. hystrix* and *E. setosa*) have been described, but they are believed to be the same, the differences between them being due to age and climate. The E. is about the size of the hedgehog, like which animal its back is covered with strong and very sharp spines. These are of a dirty white tipped with black, and, as in the case of the hedgehog, are erected as a means of defence. The snout is long and tubular, the tongue extensile and covered with a viscous secretion, enabling the E. to capture its food, which consists of ants. The mouth is unprovided with teeth, but on the palate there are several rows of spines, directed backwards. Each foot is armed with five powerful claws, by means of which the animal can burrow with great facility. It favours sandy localities, and is nocturnal in its habits.

Ech'imyd (*Echimys*), a peculiar genus of Rodent mammalia, allied somewhat to the *Myoxidæ* or dormice, and inhabiting S. America. The fur is mingled in some species with spines, and has procured for the animals the name of 'spiny rats.'

Echin'idæ. See ECHINUS.

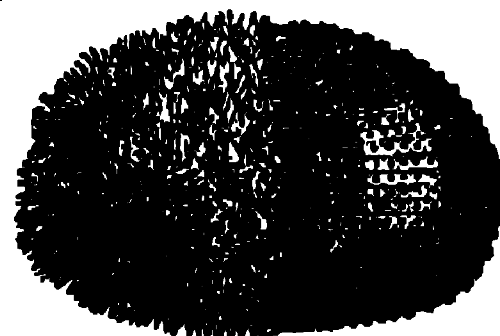
Echinocac'tus. See CACTACEÆ.

Echinoder'mata, a well-marked group of the animal world, regarded by some naturalists as entitled to rank of itself as a sub-kingdom of animals, but more usually considered to form the typical class of the sub-kingdom *Annuloida* (q. v.) or *Echinozoa*. It is represented by the *Echinoidea* (sea-urchins), *Asteroidea* (starfishes), *Holothuroidea* (sea-cucumbers), *Crinoidea* (sea-lilies), and by the extinct orders *Cystoidea* (q. v.) and *Blastoidea* (q. v.). The characters of the E. are found in the general presence of a limy secretion in the skin or *perisome;* in the possession of a distinct digestive canal, a nervous system, and heart; in the presence of a water-vascular system, subserving locomotion; and in the absence of paired or lateral appendages. The symmetry of the body is readily seen to be *radial*.

Echinorhyn'chus, a genus of intestinal worms found in the digestive organs, and sometimes in the abdominal cavity of vertebrated animals. The body is round, sometimes elongated, and often shortened to a kind of sac. The proboscis is armed with hooks, by which they attach themselves to the coats of the intestines. *E. gigas* is the largest known species; it is found in the hog and the wild boar, and the females are sometimes fifteen inches long. *E. hæruca* is a smaller species, and has been found in the liver of the cat.

Echinozo'a. See ANNULOIDA.

Echi'nus, or **Sea-Urchin**, a typical genus of *Echinodermata* and of the order *Echinoidea*, having the body enclosed in a *test* or globular shell formed of layers of hexagonal limy plates, and which (save in a few instances—*Echinothuridæ*) is of rigid nature. The plates in all living Echini are disposed in ten double rows, which divide the shell meridionally into zones. Five of these double rows are perforated with holes for the protrusion of the numerous tube-feet or *ambulacra*, and are hence named *ambulacral areas*. The intervening and alternating five rows are not perforated, and are named *interambulacral areas*. In some cases the ambulacral areas do not extend from pole to pole of the shell, but are limited in the form of a rosette-like arrangement to the upper pole. This arrangement is named *Ambulacra circumscripta*, and is seen in the heart-urchins; and the name *A. perfecta* is applied where the ambulacral areas extend completely (as in the common E.) from pole to pole. The mouth opens at the lower pole, and the anus at the upper pole of the shell. Around the mouth an oval membrane


Echinus Esculentus.

of leathery nature exists, and at the anal pole a series of five (*genital*) plates are perforated, each for the duct of the reproductive organs; whilst other five plates, alternating with the genital plates, are named *ocular* plates, from the fact of each bearing a little *ocellus*, or *eye*. One of the genital plates is perforated like the 'rose' of a watering-pot, and is named the *madreporiform* plate, being used for the admission of water to the *water-vascular* or *ambulacral* system. The exterior of the E. shell bears numerous spines, each movable and articulated by a ball-and-socket joint to a tubercle on the shell. The spines have gained for the Echini the name of 'sea-hedgehogs;' whilst the shell without the spines has given origin to the name 'sea-eggs,' often applied to these animals. Peculiar parasitic organisms, known as *Pedicellariæ* (q. v.), occur on the exterior of the E. shell. The digestive system includes a set of five jaws—named the 'lantern of Aristotle,' a gullet, stomach, and intestine. A tubular heart exists, and is connected with the alimentary canal by circular blood-vessels; and the nervous system consists of a ring surrounding the gullet and giving off five chief nerve-trunks. Breathing is subserved by a peculiar vascular and ciliated membrane, the *mesentery*, which supports and attaches the internal organs to the walls of the shell. The ambulacral system consists of a set of vessels, by which water is introduced into the shell, for the purpose of inflating the numerous little tubular feet, each provided with a terminal sucker, and by means of which these animals move slowly about. The sexes are distinct in all these forms; and in their development the Echini pass through a metamorphosis. The Echini are classified into the *Echinida* (with no more than twenty rows of plates in the shell), and the *Tessdata* (with more than twenty rows). The former group includes all living Echini, exemplified by the genus *Echinus* itself, by the 'heart' and 'cake' or flat urchins (*Spatangidæ*), by *Cidaris*, and numerous other forms.

Ech'o (Gr. 'sound,' especially a 'returned sound'). If a series of sound-waves travelling through the air meet an opposing obstacle, a portion of the energy will be transmitted to the obstacle in the form of vibrations, which may be ultimately communicated to another region of the air as sound, while another portion will be simply *reflected* at the surface in a direction generally differing from the original one. This portion when heard constitutes an E. When the sound-waves strike the surface at right angles, the E. will be heard at the spot whence the sound proceeded; or they may be so directed after impinging obliquely upon several surfaces in succession. If the reflecting surface be close at hand, sufficient time may not have elapsed to distinguish the E. from the original sound, as in the case of large rooms or vaulted caves, when there is simply a confused *resonance*. Assuming ⅑th of a second as the shortest interval between two successive sounds which can permit of them being completely distinguishable by the ear, it follows that for the perception of a distinct E., the reflecting surface must be about 60 feet distant, since sound travels at the rate of from 1050 to 1150 feet per second. A reflecting surface may be of such a form that a sound radiating from a certain spot may be so reflected as to converge at another definite spot; and thus the slightest whisper uttered at the former place may be distinctly heard at the latter, though inaudible elsewhere. An Ellipse (q. v.), with its foci, fulfils such a condition. The elliptical form of the Albert Hall quite marred the music with which its opening was inaugurated —the orchestra having been heedlessly placed at one of the foci. The Whispering Gallery of St Paul's is also of this nature. Some echoes, again, are capable of repetition for a considerable number of times, the reflecting surfaces acting in the same manner as the mutually-inclined mirrors of a kaleidoscope. Such are the echoes of Killarney, and that of Simonetta near Milan, described by Southwell as repeating the report of a pistol sixty times. The prolonged rolls of thunder are simply a succession of echoes produced by reflection from the huge cloud-masses scattered over the sky.

E'cija, a town in the province of Sevilla, Spain, on the Xenil, 45 miles N.E. of the city of Sevilla. It stands in a fertile plain, is embosomed in trees, has a fine *alameda* or public walk, several churches, monasteries, and hospitals, and Saracenic gates and towers. It has manufactures of linens, woollens, and leather. Pop. 33,700. E., the ancient *Astigis* (in Basque or Iberic, 'rock-dwelling'), became the *Colonia Augusta Firma* of the Romans, and Roman remains have been found.

Eck, Johann Mayr von, a celebrated theological disputant, was born at Eck, Swabia, in 1486, studied at Heidelberg and Tübingen, and was appointed for his argumentative skill to the chair of theology in Ingolstadt University in 1510. His attack on Luther's *Theses*, in his *Obelisci* (1518), drew him into a public discussion with Luther and Karlstadt at Leipsic in 1519. His hatred towards the Reformers, to whom he affixed the name *Lutherans*, was implacable. Through his influence the papal bull of 1520 was issued, which condemned Luther's writings as heretical and erroneous. He was prominent in the Augsburg Diet, 1530, in the Conference of Worms, 1540, where he argued for three days with Melancthon and others, and in the Conference of Ratisbon, 1541. He died at Ingolstadt in 1543. He was self-confident, greedy, ambitious, and possessed slender talents and learning. He produced numerous polemical, ethical, and theological works, of very little value. His translations of the Bible had no success. See Wiedemann's *Dr Johann Eck* (Regensb. 1865).

Eck'ermann, Johann Peter, the friend of Goethe, was born in 1792 at Winsen on the Luhe, a little town between Luneburg and Hamburg. He studied at Gottingen in 1823, where he became private secretary to Goethe, with whom he lived on terms of the closest intimacy, and died at Weimar, 3d December 1854. His chief work is his *Gespräche mit Goethe*. The first part of these was published at Leipsic in 1836, the second at Magdeburg in 1848. They have been translated into all European languages. There is an American translation by Fuller (Boston, 1839), and an English by Oxenford (Lond. 1850). E.'s work is of the highest value, being a faithful picture of Goethe's domestic and literary life, and throwing a clear and full light on the varied genius of that great man. The *Gespräche* also contain, as their author himself says, 'many valuable explanations and instructions as to science, art, and the practical affairs of life.' E. also edited (1839-40) the *Sämmtlichen Werke* of Goethe, in 40 vols. A slight autobiography of E. is prefixed to the *Gespräche*.

Eckh'a, the name for the most common wheeled conveyance in India. It is a light two-wheeled cart, without springs, drawn by a pony, and covered with a cloth awning on a wooden framework. The E. is rarely used by Europeans, but natives will take long journeys in it. A good pony has been known to take a loaded E. 60 miles in twelve hours.

Eck'mühl, or **Egg'mühl**, a village in Lower Bavaria, on the Laber, 11 miles S. of Ratisbon, the scene of the defeat of the Archduke Karl of Austria by Napoleon I., 22d April 1809. Karl's attempt to seize the highway to Donauwörth, which would have secured the possession of Bavaria, was frustrated on the 21st by Davout; and next day Napoleon, with 65,000 men, suddenly attacking the Archduke, whose force amounted to only 28,000 men, compelled him to retreat on Ratisbon, with the loss of 6000 men and 16 guns. For his share in this engagement Napoleon created Davout, then Duc d'Auerstadt, Prince d'E.

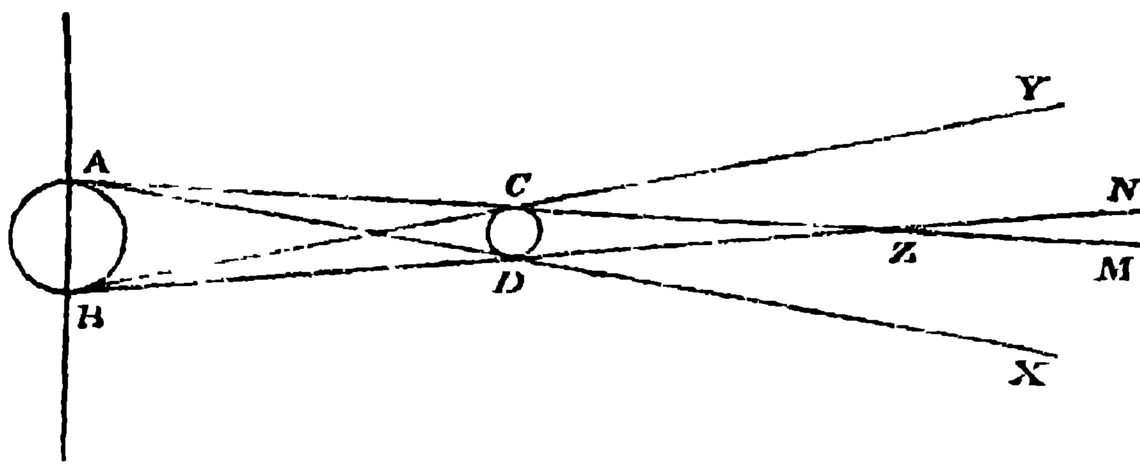
Eclamp'sia (Gr. *ek* and *lambanō*, 'I seize'), a term used to designate two convulsive affections, the one being common to childhood, and the other to the puerperal state. These affections are more frequently called *infantile*, and *puerperal convulsions*. The latter most frequently occur during or immediately after childbirth. E. depends upon a source of irritation of the periphery of the nerves, generally of a transient nature, and it disappears when the exciting cause is removed. It is distinct from the convulsions of hysteria, epilepsy, catalepsy, muscular convulsions, apoplexy, &c. It is an exceedingly alarming disease, and sometimes ends fatally. E., connected with the puerperal state, is much more dangerous than in the case of infants, and when it occurs, parturition should be accelerated as rapidly as possible.

Eclec'tics (from Gr. *eklegein*, 'to choose'), the name given to those philosophers who select various doctrines from earlier schools, and seek to form them into an harmonious system. The Neo-Platonic school of Alexandria is the chief eclectic school of ancient times, blending a subtle Greek dialectic with Oriental mysticism and Christian metaphysics. Bacon and Descartes, and also Hegel, have been styled the founders of modern eclecticism. The chief eclectic of recent times was Victor Cousin, whose system seems to have been

based on a passage in Hegel's *Geschichte der Philosophie*. Cousin sought to combine the principles of Reid and Stewart with those of Proclus, Kant, Hegel, and others, and through his brilliant rhetoric won for his system a wide but fleeting popularity. At one time the chairs of philosophy in France were almost all held by his followers, but his eclecticism has now fallen into disrepute. See COUSIN.

Eclip'ses (Gr. *ekleipsis*, lit. 'a leaving out,' hence 'a failing to appear') are those astronomical phenomena in which a greater or smaller portion of a luminary is cut off from view. This may occur in two distinct ways—either by the intervention of an opaque body between the luminary and the observer; or, if the eclipsed body be of itself non-luminous, by the interception of the light which, by its reflection, renders the body visible. To the former class belong solar E., those of Jupiter's or Saturn's satellites, as sometimes viewed from the earth, transits of Venus and Mercury, and occultations of stars; while lunar E., and the transit of a satellite's shadow over the disc of Jupiter and Saturn, may be mentioned as cases of the latter class. The word *eclipse*, however, when used without any qualification is understood as referring to either the sun or the moon; and it is in this restricted signification only that these phenomena are briefly discussed here.

A Lunar Eclipse is occasioned by the passage of the moon through the earth's shadow, necessarily accompanied by the interception of a portion of the sun's light, which would otherwise fall upon the moon's disc. This can only happen when the earth is between and in the same straight line with the sun and moon, *i.e.*, at the time of full moon. A consideration of the annexed figure will make the whole quite intelligible. A B represents a plane section through a great circle on the sun's surface, and C D a similar section of the earth's—both sections being in the same



Eclipse.

plane. Draw to these circles the four common tangents A X, A M, B Y, B N. In consequence of the much greater distance separating the earth and sun, as compared with their diameters, we may suppose these tangents to intersect at A B and C D—the extremities of two parallel diameters. Now the space C D Z is the section of a cone within which there is total shadow. This cone is called the *umbra*; and it is the entrance of the moon into this region which constitutes an eclipse—total or partial, according as the moon is wholly or partially immersed. Around this cone is another region, represented in section by Y C Z and Z D X, from which sunlight is partially excluded, and which is known as the *penumbra*. To an observer on the moon during its passage through this region, the sun would present the same appearance that it does to us during a partial solar eclipse. There is not, however, an eclipse at every full moon, since the moon's orbit does not lie in the plane of the ecliptic, but makes with it an inclination of rather more than 5°. The phenomenon is only possible when the moon at its full is sufficiently near its node; and it is found from calculation that no eclipse can take place if the node be distant from the point of the ecliptic opposite the sun by more than 11° 25′ 40″, and that an eclipse *must* take place if this distance be less than 9° 20′ 29″. The possibility of their being an eclipse within these limits depends on the relative distances of the sun and moon from the earth at the time. Even in the *umbra*, however, the moon receives solar light which has been refracted through the earth's atmosphere, and it is therefore usually distinguishable as a dark, copper-coloured disc.

A Solar Eclipse is caused by the interception to a terrestrial observer of the whole or a portion of the sun's light by the opaque body of the moon. Accordingly, it cannot take place but at new moon, and then, as in the case of lunar E., only when the moon, while in this position, is sufficiently near its node. The limits, corresponding to those given above for a lunar eclipse, are 15° 35′ 56″ and 17° 50′ 42″—the possibility of an eclipse happening within these again depending on the relative distances of the sun and moon from the earth. The only true difference between a lunar and solar eclipse is that in the former the moon passes through the earth's shadow, while in the latter the earth passes through the moon's; but to a terrestrial observer the apparent differences are very striking. An eclipse of the moon is visible to all observers on the hemisphere of the earth turned away from the sun, and undergoes all its phases at precisely the same time for all observers; an eclipse of the sun is visible over a limited area, and differs in its extent and the time of its occurrence for every observer. The breadth of the earth's shadow at the moon's distance is considerably greater than the moon's diameter; that of the moon's shadow on the earth is at most a few miles, while sometimes the *umbra* falls short of the earth altogether—a phenomenon which cannot happen unless the moon's apparent diameter be less than the sun's. During a lunar eclipse the moon is always wholly immersed in the *penumbra*; during a solar eclipse the earth is never so, and hence the explanation of the fact that an eclipse of the sun is invisible at localities outside a certain closed area of the earth's surface. An eclipse of the moon is totally independent of the earth's diurnal rotation; but a solar eclipse is not. It is this consideration that renders the calculation of the latter so complicated and difficult compared with that of the former. In both, E. may be total or partial, but only in the case of the sun can there be what is termed an *annular* eclipse. This happens when the moon passes centrally over the sun's disc, the *umbra* at the same time falling short of the earth.

The earliest recorded solar eclipse is that mentioned in Chinese history as having taken place in the reign of Shing-kang about 2169 B.C. It is mentioned incidentally in connection with the names Ho and Hi, two astronomers who were put to death for neglecting to predict the phenomenon. The famous total eclipse, predicted by Thales of Miletus, and which according to Herodotus interrupted the battle between the Lydians and Medes, occurred, if we accept the calculations of Sir G. B. Airy, on May 28, 585 B.C. The total E. of Xerxes (478 B C. ?) and of Agathocles (August 15, 310 B C., according to Airy) may also be noted. In later times, we have the celebrated E. of 1433 and 1598, both total in Scotland; and that of May 3, 1715, the last total eclipse observed in England. The years 1868–71 will always be memorable for their total E., and for the great service done to astronomical science during their observation. That of August 17, 1868, observed in India, is celebrated for the long duration of totality—as much as 6 minutes 50 seconds; that of August 7, 1869 was well observed in N. America; that of December 22, 1870 was not successfully observed; while that of December 12, 1871 was visible in Ceylon and Southern India. The same interesting series of E. will recur in precisely the same order after the lapse of between eighteen and nineteen years. (See METONIC CYCLE.) The most striking phenomena to a scientific observer during a total eclipse of the sun are the corona or ring of light, and the irregular red-coloured protuberances round the dark body of the moon. The corona depends greatly for its size and appearance upon the condition of the earth's atmosphere; but the protuberances are truly solar, being the huge flames of the ignited gases which form the sun's chromosphere. These flames, which can now be observed by means of a spectroscope without the aid of a total eclipse, are best considered under SUN. It is enough to mention that at the moment of totality the solar spectrum is reversed, the continuous spectrum disappearing, and the absorption lines becoming bright. (See SPECTRUM ANALYSIS.) For more detailed information regarding E., both mathematical and descriptive, see Supplement to the *Nautical Almanac* for 1836, by Mr Woolhouse, Herschel's *Outlines of Astronomy*, and Proctor's *Sun*.

Eclip'tic, the course among the stars which the sun, in virtue of the earth's annual revolution, seems to pursue—so named from the *Eclipses* (q. v.), which only happen when the moon is in or near this great circle. The E. does not coincide with the celestial equator, and accordingly the sun has an apparent annual motion in Declination (q. v.) as well as in right ascension. (See ASCENSION, RIGHT.) On the 21st of June and the 21st of Decem-

ber, or thereabouts, the sun reaches its greatest distances N. and S. of the equator, being then at its summer and winter solstices respectively. The *obliquity* or angle of *inclination* of the E. to the equator is continually changing, being affected by the positions of the other planets, and by the earth's own Nutation (q. v.); but the difference between its extreme variations can never exceed 2° 42′. Its mean value is 23° 27′ 19″·93. The nodes, or the points at which the E. intersects the equator, are called the equinoxes, the vernal equinox occurring about the 21st of March, and the autumnal about the 22d of September. They are subject to a slow but continuous westward motion, each having an angular annual motion of 51″·1, and therefore taking 25,362 years to make one complete revolution. This continuous variation is known as the precession of the equinoxes. (See ARIES, PRECESSION.) The E. is divided into twelve equal portions, each containing 30°, and receiving its name *originally* from the constellation which occupied the same space in the heavens. In consequence of precession, however, the *signs*, as they are called (see ZODIAC), no longer coincide with the constellation of the same name

Ec'logue (Gr. *eklogē*, 'a selection'), was at first the name of a poem, or series of poems, chosen on account of their beauty from an author's work; afterwards the term was applied to Virgil's *Bucolics*, or pastoral poems, and hence has become synonymous with a pastoral idyll. See PASTORAL POETRY.

École Polytechnique'. In 1794 the National Convention of France, to prepare young men for the public services, and especially for engineering, civil and military, created an educational institution, named at first *l'École des Travaux Publics*, but after September 1, 1795, the E. P. Founded on the plan of Monge, the school was reorganised in 1816, and its constitution has been subsequently modified. It supplies cadets for the artillery service of the army and the fleet, for military and naval engineering, for the corps of engineers of roads, bridges, mines, &c. It is under the control of the Minister of War, and is subject to military discipline. The governing staff is military, but the teaching staff may either be military men or civilians. Admission is by competitive examination, and the competitor must be a Frenchman or naturalised, a bachelor of science, and between sixteen and twenty years of age, except in the case of officers already serving under the French flag, who are admissible to the age of twenty-five years. The outfit required costs from 500 to 600 francs, and board costs 1000 francs per annum, but assistance is given to poor students under certain conditions. The course extends to two years, in each of which special subjects require to be mastered. There is an examination at the close of the first, and the great examination at the end of the second year. The measure of success at the latter regulates the position to which cadets may at once attain.

Econ'omy, a Socialist community on the right bank of the Ohio, in Pennsylvania, 17 miles N.W. of Pittsburg, formed by Germans in 1825. It has 3500 acres of land, and carries on manufactures of silk, cotton, and wool. Pop. (1870) 1600.

Economy, Political. See POLITICAL ECONOMY.

Écoutes' (Fr. 'listening places,' from *écouter*, 'to listen'), galleries made beneath or before a glacis to shelter troops placed there to disturb the miners of the besiegers.

Écraseur (Fr. *écraser*, 'to crush'), an instrument invented by M. Chassaignac, of Paris, for removing diseased parts from the living body by a rapid process of strangulation. The E. consists of a loop of fine steel chain, wire, or other material, which, having been passed over the tumour or through the tissues to be removed, is gradually tightened by a mechanism in the stem, to which it is attached, until the tumour is completely separated. By this means the operation is completed with little or no hæmorrhage, and in many cases parts can be operated upon more conveniently than by the scalpel, such as in vaginal tumours, cancroid ulceration of the tongue, and the like.

Ec'stasy (Gr. *ekstasis*, 'a change of anything from its ordinary place') is the term applied by Plotinus and the other Alexandrian philosophers to that faculty by which they fancied they obtained a knowledge of God and the world of universal ideas not liable to the imperfections of knowledge obtained through organic conditions, and manipulated by a finite mind. In some cases, it produced immediate vision of beauty or moral perfection; to philosophers, by the gradual process of dialectics, it revealed the ideas of unity and proportion. Music, dialectics, and love or prayer, are its three sources. This faculty, called by Proclus 'illumination,' dealt with such subjects as the Alexandrian unity; the three hypostases of absolute unity, the first intelligence, and universal soul; and the doctrine of Emanation (q. v.). E. may in the same sense be applied to the vision of such mystics as Behmen, Tauler, &c. More generally, E. is applied to a mental state, in which an emotion seems to absorb the whole mental force, and leave none for will or intellect. E. is also a medical term for the morbid state in which consciousness of external objects and also voluntary motion are suspended, the mind being fixed in abstract contemplation, and the muscles generally rigid, or only partly relaxed. It is distinguished from catalepsy and trance *proper* by the presence of intelligence. The predisposing causes are all those which lower the nervous system. E. may be induced by religious excitement or mesmerism. It is probably accompanied by cerebral congestion, and often passes into epilepsy and mania.

Ec'tasis (from the Gr. *ekteinō*, 'I stretch out'), a term used to indicate aneurismal distension of the walls of the pulmonary artery or capillaries, as seen in the air-cells.

Ecthy'ma (Gr. *ekthūma*, 'a pustule') is an acute inflammation of the skin, characterised by an eruption of large round pustules, upon a hard inflamed base. The pustules are discrete and scattered, with dark-coloured crusts, which on separation often leave a brown stain or a superficial ulcer, followed by a cicatrix. The eruption seldom occurs on the face or scalp, and is most frequent during spring and summer in young adults. *E. chronicum* has three varieties—*E. infantile*, which appears in ill-fed and delicate children or in those debilitated from previous disease; *E. luridum*, in old persons whose constitution has been injured by excesses; and *E. cachecticum* in persons of unsound and cachectic constitutions of all ages. The pustules resemble those following the irritation produced by tartarised antimony. Treatment—gentle laxative and alterative medicine, with diluents and abstemious regimen, and for local application solution of superacetate of lead. In the chronic form, tonics and alteratives, as nitro-muriatic acid with gentian.

Ec'toderm (Gr. *ektos*, 'without,' and *derma*, 'the skin'), the name applied to the outer of the two layers into which the tissues of Cœlenterate animals are divided. The E. corresponds roughly with the outer 'skin' of higher animals. In sponges and higher forms, the name 'E.' is also given to the external layer of the tissues, and is used in contrast to the *endoderm* or inner layer.

Ectozo'a (Gr. *ektos*, 'without,' and *zoos*, 'living'), a name used only in a general sense in zoology for such parasites as lice, ticks, and many lower crustacea, which live upon the skin or external surfaces of other animals.

Ectro'pium, or eversion of the eyelids, is caused by swelling and protrusion of the conjunctiva, and also by morbid contractions and adhesions, or partial or total destruction, of the skin of the eyelids. E. may be cured by a simple plastic operation.

Ectrot'ic (from Gr. *ektrōma*, 'abortion'), a term used to indicate modes of treatment which aim at preventing the development of disease, as cauterisation to destroy the pustules of small-pox or limit the spread of erysipelas.

Ecuador' (the Spanish form of 'equator'), a republic of S. America, so called from lying on both sides of the equator; bounded N. by the United States of Colombia, E. by Brazil, S. by Peru, and W. by the Pacific. Its area is estimated at 218,984 sq. miles, and its pop. at 1,300,000, of whom 200,000 are Indians. The Guayaquil is the only considerable stream in the W.; the Japura, Napo, and Putumayo, affluents of the Amazon, drain the E. The country is traversed by a double range of the Andes, which encloses plateaus of from 8000 to nearly 10,000 feet above the sea. The highest summits are Chimborazo, 21,424 feet; Cayambe, 19,535; Antisana, 19,137; and Cotopaxi, a volcanic cone 18,875. The climate varies much—from the tropical heat of the low tracts to the perpetual spring of the valleys and the cold of the region of perpetual snow. The capital is Quito (q. v.), and the chief port Guayaquil. The chief exports

are cocoa, caoutchouc, and Peruvian bark; the chief imports are cotton and woollen goods, wines, groceries, flour, and hardware. In 1873 the value of the former was £405,000, and of the latter £199,200. The largest trade is carried on with Great Britain. In 1873 the revenue amounted to £730,102, and the expenditure to £787,112. The constitution, dating from 31st March 1843, vests the executive in a President, elected for four years, and the legislative power in a congress of two houses. E. rebelled against Spain in 1820, joined Colombia in 1822, and became an independent republic in 1831. Since 1863 there has been almost incessant civil war. See Villavicencio's *Geografia de la Republica del E.* (New York, 1858), and Wagner's *Reisen in E.* in *Zeitschrift für allgemeine Erdkunde*, vol. xvi. (Berlin, 1864).

Ecumen'ical [lit. 'of the whole world,' Gr. *oikoumenikos*, from *oikoumenē* (*i.e.*, *gē*), 'the inhabited (world)', general, universal], a term applied to ecclesiastical councils when of the whole Church, to distinguish them from provincial or diocesan synods.

Ec'zema (Gr. 'anything thrown out by heat'), is one of the most common of skin-diseases. It is non-contagious, and is characterised by an eruption of numerous minute vesicles, frequently confluent, extending over a surface of irregular form, and usually of considerable extent. In the fully-developed disease the skin is often red, smooth, and shining, the tissues being loaded with infiltrations. The varieties of E. are classified according to the nature of the eruption and the parts of the body affected, the more important being—*E. vesiculosum; E. pustulosum*, or *impetigo; E. papulosum, prurigo*, or *lichen; E. rimosum; E. chronicum*, or *psoriesis*. E. may occur symptomatically, as a consequence of some constitutional disturbance, or as an effect of local irritation of the skin. See *E.*, by Dr T. M'Call Anderson (Lond. 1874).

E'dam ('the dam or dyke on the Ey'), a town in N. Holland, on the Ey, 12 miles N.N.E. of Amsterdam. It has a small harbour, manufactures of rope, salt, and leather, some shipbuilding, and trade in cheese and wood. Pop. (1870) 5185.

Edd'a (Old Norse, 'grandmother'), the name of two collections of Norse poems and legends. 1. *The Poetic* or *Elder E.*, containing the *Voluspá*, a lay on the origin and destruction of the world, and poems on the exploits of gods and heroes, which partly reappear in the German *Nibelungenlied* (q. v.). This E. was collected by Sæmund Sigfusson, an Icelandic priest (born about 1050, died 1133). Portions of it were translated into German by the brothers Grimm, and a complete translation was executed by Simrock (3d ed. 1864). 2. *The Prose* or *Younger E.*, a synopsis of Scandinavian mythology, ascribed to Snorri Sturleson (born in Iceland 1178, died 1241), who probably wrote the *Prologue* and *Epilogue*, the other parts, *The Deluding of Gylfi*, and *Conversations of Bragi*, being derived from the *Elder E.* The *Elder E.* was published at Copenhagen, 1828; later editions are those of Munch (1847), and Mobius (1860). The *Prose E.* was published by Resenius (1665), and by Rask (Stockholm, 1818). The latest edition is that of Sweinbjorn Egilsson (1848-49). The *Elder E.* was discovered in 1643 by the Icelandic bishop Brynjolf; the *Younger E.* in 1623 by Arngrim Johnson. See Mallet's *Northern Antiquities*, Thorpe's *E. of Sæmund* (Lond. 1866), and Magnusson and Morris's translation of songs from the *Elder E.* (Lond. 1870).

Edd'oes. See Cocco.

Edd'ystone Lighthouse, stands on a very dangerous reef, submerged at high water, about fourteen miles from Plymouth. The character of this reef, and its proximity to an important port, caused measures to be taken very early for the protection of shipping. In 1696 a gentleman named Winstanley obtained authority to erect a lighthouse there, and in 1700 his building, a wooden one, was finished. It was destroyed during a terrible storm in 1703, the workmen, lighthouse-keepers, and Winstanley himself all being drowned. Six years later another wooden lighthouse was built on the same site by a Mr Rudyerd, and this remained until 1755, when it was burnt down. Smeaton (q. v.), the celebrated engineer, was then called in, and to him we owe the present graceful column which has defied storm and wind for more than a century. The work began on the 2d April 1757, and was finished on the 4th August 1759. The sloping top of the rock, which is uncovered at low water, was cut into steps to form a foundation; from these for 35 feet upwards the tower consists of solid masonry (excepting a passage way and small central staircase)—blocks of Portland stone (oolite) and granite dovetailed together and set in cement, and further secured with marble joggles. Above this the building contains four rooms, one over the other, the whole being surmounted by a gallery and the lantern. The tower itself is 68 feet high, its diameter at the lowest complete course 26 feet, at the top, 15 feet. In Smeaton's time the only light exhibited came from a frame supporting twenty-four candles. The fixed light now used can be seen at a distance of about 13 miles. A contract for rebuilding the lighthouse in three years was concluded in August 1878.

E'delinck, Gerard, a Flemish engraver, born at Antwerp in 1649, went to Paris in 1666, where he became professor at the Gobelins, and died 2d April 1707. He engraved many of Le Brun's pictures, and some of Raphael's and Leonardo da Vinci's. His style was clear, brilliant, and accurate, and his works rank among the foremost of their kind.

E'den (Heb. 'delight' or 'loveliness'), according to the Book of Genesis, was the site of a garden in which the first man and woman were placed by their Maker. The only guide we have to the locality indicated is that the garden was watered by a river which was 'parted into four heads'—Pison, Gikhon, Hiddekel, and Phrath. Hiddekel and Phrath are easily identified as the Tigris (Dan. x. 4) and Euphrates; but the conjectures offered in the attempt to identify the other two have been almost innumerable. The problem is to find a locality *on the Euphrates and Tigris*, with two other rivers that would correspond to the Pison and Gikhon, and with the adjunct at the same time of regions answering to Khavilah and Cush, which were 'compassed' by these rivers respectively. (1) A number of eminent scholars (Calvin, Bochart, Huet, &c.) have fixed the locality of E. in the lower part of Babylonia, making the Pison and Gikhon the two channels by which the united stream of the Euphrates and Tigris enters the Persian Gulf. (2) Others (Reland, Calmet, Rosenmüller, &c.) have found it at the source of these two rivers, making the 'river' from which the four streams diverged to be a 'well-watered region;' the Pison and Gikhon being two small streams (Araxes, Phasis, &c.) rising, like the two large ones, in the mountains of Armenia. (3) One of the oldest and most widely-received theories, and one which has been supported by eminent scholars in modern times (Bertheau, Ewald, Kalisch, &c.), is that by the Pison was meant the Ganges (others, the Indus), and by the Gikhon, the Nile.

The subject has now entered on a new phase owing to the recent discovery, in the terra-cotta library of Assur-bani-pal at Nineveh, of copies of Babylonian legends regarding the creation and primitive history of mankind. From these Assyrian inscriptions, then, the following details may be gathered. The name of Babylonia under the Cassile dynasty was Gan-Duni, which probably gave rise to the Hebrew Gan-Eden (Garden of E.). Gikhon is, letter for letter, the same as Gukhan-de, the Akkadian name (Akkad, with a capital of the same name, was Upper Babylonia, the original state) of the Arakhtu or Araxes, 'the river of Babylonia,' which joined the Euphrates at Babylon, after flowing through a deep valley which runs into the heart of Northern Arabia; so that it would literally 'compass the whole land of Cush,' *i.e.*, S. Arabia. Hiddekel was the Akkadian name of the Tigris, and Pison the Pasi-Tigris; Khavilah being probably Khuliya, which was situated on the last-named stream.

On the other hand, the mountainous region of Armenia is sometimes called in the inscriptions 'the land of the four rivers,' because in it four streams take their rise, of which three are the Araxes, Euphrates, and Tigris. It was from this region (the cradle of the Turanian race), moreover, that the Akkadians (Highlanders) originally came; and if the site of E. had been *transferred* from Armenia, in which four rivers took their rise as if from one source, to Chaldæa, the four rivers of which run into one stream, this combination of two geographies would explain the ambiguity in Gen. ii. 10-14, in which the four are described as branching off from a single parent stream, and at the same time as flowing from four distinct 'heads,' which commentators have laboured to show do not mean sources, but streams. See Smith's *Chaldæan Account of Genesis* (1876).

Eden (perhaps from the root *dan* or *don*, 'water'?), a river rising in the Pennine chain in Westmoreland, near the N.W.

boundary of Yorkshire. It traverses Westmoreland and Cumberland in a N.N.W. direction, and falls into the Solway Firth after a course of 65 miles.—E., a river in Scotland, rises in the east of Kinross-shire, traverses Fifeshire, and falls into St Andrews Bay, after a course of 20 miles. There are also lesser streams of the same name in Kent and Roxburgh.

Edenta'ta (Lat. *e*, 'without,' and *dens*, 'a tooth'), an order of Placental or higher mammalia represented by the anteaters, sloths, armadillos, pangolins, and by the aard-vark or Earth-Wolf (q. v.) of S. Africa. They are so named from the rudimentary structure of their teeth, only one set of which is developed. They are therefore Monophyodont mammalia. Moreover, the teeth have no enamel covering or true roots. Incisors are wanting, save in one of the armadillos, and canines are generally absent. Clavicles are usually developed. The skin may develop bony plates (armadillos) or horny scales (pangolins). The testes are abdominal, and the mammary glands pectoral or abdominal. The toes have powerful nails. The E. chiefly occur in S. America, where remains of extinct E., often of large size (*Glyptodon*, *Megatherium*, &c.), are also found.

Edess'a (Gr. *Callirhoe*; mod. *Urfah* or *Orfa*), an ancient town in the N. of Mesopotamia, about 70 miles W.S.W. of Diarbekr. It is still a place of importance from its situation on the commercial highway between Aleppo and Kurdistan, and carries on morocco-leather manufactures. Pop. 30,000, of whom 2000 are Armenian Christians. Its origin is unknown. It was enlarged by Seleucus, and in his time was named E. from a Macedonian town of the same name. After the spread of Christianity E. was celebrated for its schools of theology, the chief of which, the *Schola Persica*, vigorously engaged in the Nestorian controversy against St Cyril in the 5th c. E. was taken by Baldwin in the first crusade (1097), and made the capital of a county of the same name, which was the bulwark of the kingdom of Jerusalem for fifty years.

Ed'fou (Coptic *Atbo*, anc. *Apollinopolis Magna*), a town of Upper Egypt, on the left bank of the Nile, about 13 miles below the Lesser Cataract. The ruins of its two temples are among the most interesting in Egypt. The sculptures of the chief temple represent the progress of the Sun through the circle of the Hours. The entrance is a gateway 50 feet high, flanked by two pyramids 114 feet high. The temple, founded by Ptolemy Philometer, 181 B.C., is 145 feet wide and 424 feet long, was girt by a wall 20 feet high, and could serve as a fortress. Within the square is a covered colonnade, faced by a portico 53 feet high, with a triple row of pillars having richly-foliated capitals. The modern E. is a poor village, with manufactures of cottons and pottery. Pop. 2000. See Wilkinson's *Modern Egypt*, Russeger's *Reise in Ægypten*, and Brugsch's *Reiseberichte*.

Ed'gar. See EADGAR.

Edge'cumbe Bay, or **Port Denison**, is situated on the coast of Queensland, its entrance being in 20° S. lat., 148° 10′ E. long. The town of Bowen is built on its western shore, about half way from the entrance.

Edgecumbe, Mount, a conical mountain at the mouth of Norfolk Sound, on the island of Sitka, on which the Russians established the colony of New Archangel, now belonging to the United States. It has quite recently been an active volcano, and traces of its action are manifest.

Edgehill', Battle of, was fought at Edgehill in Warwickshire, on Sunday, 23d October 1642, between the Royalists, led by Charles I. in person, and the Roundheads under Robert Earl of Essex, son of Elizabeth's favourite. It was the first important action of the civil war. Prince Rupert, who commanded the royal cavalry, broke the left wing of the Parliamentarians, and pursued it to Keinton, where his troopers took to plunder, while Essex with his right wing compelled the Royalists to retreat. Of 4000 that fell in the battle, the larger proportion belonged to the army of Charles.

Edge'worth, Richard Lovell, an English mechanician, was born at Bath in 1744, educated at Oxford, and settled in Ireland in 1782. He was returned to the Irish Parliament, in which he spoke against the Union. E. made experiments relating to carriages, railways, &c., and in 1804 was employed by the British Government to establish telegraphic communication between Dublin and Galway. He died June 13, 1817. Among his works are *Practical Education* (1798), written in concert with his daughter Maria; *Professional Education* (1808); *Essay on the Construction of Roads and Carriages* (1813); and various treatises on subjects connected with mechanics. See *Memoirs of R. L. E., begun by Himself and concluded by his Daughter* (Lond. 1820).—**Maria E.**, daughter of the preceding, was born at Hare Hatch, Berkshire, January 1, 1767. In 1782 she accompanied her father, Richard Lovell E., to Ireland, and remained with him until his death in 1817. He was a part author of her first work, *Essays on Practical Education* (1798), and of her *Essay on Irish Bulls* (1801). Her knowledge of the habits and qualities of the Irish peasantry was embodied in numerous entertaining fictions. She was the friend of Scott, Moore, Herschel, &c. She died at Edgeworthstown, Longford, Ireland, May 21, 1849. Her writings comprise *Castle Rackrent* (1801); *Belinda* (1803); *Lessons for Literary Ladies, Early Lessons, Popular Tales* (1804); *Leonora* (1806); *Memoirs of R. L. E., Tales of Fashionable Life* (1809). A collection of these appeared in London in 1825, in 14 vols. (new ed. 10 vols. 1857).

Edg'ing Iron an implement of crescent form, with a spade handle, used for cutting the sides of drains.

Edg'ings, in horticulture, rows of low-growing plants to mark off a flower-bed from gravel walks or from a lawn. Stone, wood, wicker or wire work, or turf are sometimes used for E., but the dwarf-box is most commonly employed. See HORTICULTURE.

Ed'ible Fungi. See FUNGI.

Edible Birds-Nests. See NESTS, EDIBLE.

E'dict. All the higher magistrates of Rome issued edicts. The consuls convoked the comitia, army, and senate by E.; the censors proclaimed the census by E.; the ædiles published market rules by E.; the magistrates with jurisdiction laid down every year their rules of justice by E.—the Prætor Urbanus, the Prætor Peregrinus, and the Ædilis Curulis in the *edicta urbana*; the provincial governors in the *edicta provincialia*. The E. was orally proclaimed, and also written on a white tablet suspended in the forum, so that persons standing on the ground might read it. The general E. put out by the magistrate on entering office was called *perpetuum*, as lasting through his term of office; an occasional E. was called *repentinum*; a part taken from the E. of a predecessor in office was called *tralatitium*. One E. did not differ much from another, and after the consolidation of prætorian law (*jus honorarium*) by the lawyer Julian in the reign of Hadrian, this part was stereotyped. E. was also applied to the legislative ordinances of the emperor, as supreme magistrate; these were distinguished from *decreta*, or judicial decisions on appeal or in certain classes of actions involving a delicate discretion, and *epistolæ* or *rescripta*, which was an interpretation of the law by the emperor in answer to a query. All these imperial constitutions had under the Lex Regia the force of laws.

E. in Scotland meant merely a formal public notice, at a church door or market-cross, that parties might come into a suit.

In France the ordinances of the Merwing kings, chiefly to notify prohibitions or to organise some new state department, were called edicts. The name was replaced by *capitularia* under Karl the Great, but was revived by the Capetian kings. They were signed by the king, *visied* by the chancellor, and sealed with green wax to show their permanent character. Some edicts were named after the place of execution—*E. de Crémieu, d'Amboise*, &c.; others from their subject-matter—*E. des duels, des secondes nôces*, &c. The word has now been superseded by *loi*.

Edict of Nantes, granted 30th April 1598 by Henri IV. of France, was for long the only charter of Protestant liberties in that country. The Huguenots were declared eligible to all public posts. In certain districts, and in the houses of noblemen with full rights of jurisdiction, the exercise of the religion was declared free. Elsewhere, only thirty persons might be assembled at a nobleman's house for worship. Their petitions and suits were judged of by a specially constituted 'Chambre de l'Édit;' and in several of the municipal constitutions and local parliaments of the S., provision was made for chambers half Catholic, half Huguenot. The speech of Henri in the 'Parlement' is

given by Voltaire (vol. xxx. p. 233). 'Il faut que tous soient bons Français,' he says. The Edict was carried against vehement opposition by a speech of De Thou, in which he spoke of Pope John going to Constantinople to prevent Justin persecuting the Arians. Like the previous Edicts of Pacification of Chancellor L'Hôpital, and the subsequent Edict of Grace (Nîmes, 1629), the E. of N. was a mere compromise. It was systematically evaded, and finally revoked by Louis XIV., guided by Louvois and Le Tellier, in 1685, when the persecutions of Languedoc began. Complete toleration was not established till 1787.

Edict'al Cita'tion, in Scotch legal procedure, is the form by which a party out of Scotland, but under the jurisdiction of a Scotch court, is cited to appear before it. In former times this was done by proclamation at the market-cross of Edinburgh and at the pier and shore of Leith; it is now done by delivery of copies of the citation at the record office of the keeper of the records of the Court of Session. These records are open to public inspection. In criminal prosecutions, if the accused cannot be found, he must be edictally cited at the market-cross of the county town of the county in which he lives, and a copy of the citation must be left there, and at his dwelling-house.

Ed'inburgh, the capital of Scotland, and county town of Midlothian, is situated on the S. shore of the Firth of Forth, and about 1½ miles from it. The city, which covers an area of over 2 sq. miles, is built on ridges of varying height, and is environed by hills. On the S.E. rises Arthur's Seat (820 feet); to the S.W. lie the Braid Hills and the Pentlands; and to the N.W., Corstorphine Hill. Pop. (1871) 196,979; (1876) 215,146. E. is famous for the beauty of its situation, the picturesque timeworn appearance of its old streets, and the grace and stateliness of its modern buildings. The oldest part of the city, rugged and sombre, with Gothic spires and pinnacles crowning the long slope from the Castle Rock to Holyrood, contrasts strangely with the chaste Greek structures and the bright elegant aspect of the New Town. One of the most delightful features of E. is the exquisite glimpses of the sea, of hilly and sylvan scenery unexpectedly disclosed in the heart of its busiest thoroughfares.

The city receives its name E. (Eadwinesburh) from the Northumbrian king Eadwine, who built the castle in the 7th c. It became a possession of the Scottish kings in the reign of Indulf (945-961), and was then called in Gaelic *Dun-Edin*; but the earlier name has prevailed. E. did not become the Scottish capital till a later date, being too near the English border for safety; but about the middle of the 15th c. it was recognised as the metropolis. David I. made it a burgh in 1128, and it was walled and fortified by James II.

The fact that E. was originally a walled city gives to what is called the *Old Town* its peculiar characteristics of lofty houses, narrow streets, and *wynds* or *closes*. The city was originally limited to the ridge which extends from the Castle to Holyrood House. In 1769 the North Bridge (renovated and widened in 1875) was erected, spanning the valley which contained the North Loch. The construction of the *New Town*, beginning with St Andrew Square, quickly followed; stretching in parallel terraces between the Old Town and the Firth. Other improvements were the opening of the South Bridge in 1788, of Waterloo Place and the Regent's Bridge in 1819, and of George IV.'s Bridge in 1836. The latest improvement of magnitude is the spacious and handsome thoroughfare (Chambers Street) connecting George IV.'s Bridge and South Bridge. The city is at present extending rapidly westward, and its suburbs also are increasing to the S. The buildings in the New Town are constructed almost entirely of a fine sandstone brought from the neighbouring quarries of Craigleith. Among the finest streets are George Street, the centre of the New Town, and Princes Street, which runs parallel to it on the S. From the latter, which is the chief thoroughfare, is obtained a view unsurpassed in any European capital, of the Castle Rock, a steep mass of gloomy basalt, sprinkled with verdure, cre-ted with old grey battlements, and towering above the green shaded slopes of the gardens that occupy the former bed of the Nor' Loch. In the W. are many handsome streets and squares, one of which, Moray Place, is a magnificent specimen of the Doric style applied to domestic architecture.

The Castle, crowning the Castle Rock (380 feet in height), is the most prominent object of the Old Town. The Scottish regalia, consisting of crown, sceptre, sword of state, and silver rod, have been shown there since 1818. Queen Mary's Room and Queen Margaret's Chapel are also objects of interest. Midway between the Castle and Holyrood stands St Giles' Cathedral, a cruciform structure, with an ancient coronal spire. Beside St Giles' are situated the law-courts and the old hall of the Scottish Parliament, 122 feet long, with a magnificent oak ceiling, painted window, and numerous portraits and statues. Holyrood Palace occupies the site of an ancient abbey, founded by David I. in 1128, and contains a picture gallery and the apartments of Mary Queen of Scots. Among other fine buildings are the University, the Industrial Museum, Surgeons' Hall, Heriot's Hospital, the new Infirmary, the Royal Institution, National Gallery, High School, General Post-Office, Register House, St George's Church, the Scotch Episcopalian Cathedral (unfinished 1878), Bank of Scotland, the Irvingite Church (1876), &c.

E. possesses numerous monuments, the most attractive of which is the Scott Monument in Princes Street, a splendid but somewhat showy Gothic spire, erected 1840-45. In the same street are statues of John Wilson, Allan Ramsay, David Livingstone, the Duke of Wellington; in George Street, of George IV. and William Pitt; in St Andrew Square, a column in memory of Lord Melville; and in Charlotte Square, the Prince Consort Memorial (August 1876). Opposite the High School is the monument of Burns. On the Calton Hill (345 feet in height) are the columns of the unfinished National Monument, the Nelson Monument, and those of Professors Playfair and Dugald Stewart. In the graveyards of E. are the tombs of many distinguished men. In Greyfriars rest George Buchanan, Robertson, Blair, Henry Mackenzie, Allan Ramsay; in the Calton, David Hume; in the Canongate, Adam Smith, Dugald Stewart, Adam Ferguson; in the Dean Cemetery, Lord Jeffrey, Lord Cockburn, and Professor Wilson; in the Grange Cemetery, Hugh Miller and Dr Chalmers.

E. contains numerous charitable institutions, as Heriot's Hospital, Donaldson's Hospital, Chalmers' Hospital, Fettes College, &c. The funds of George Watson's Hospital, Daniel Stewart's Hospital, Gillespie's Hospital, and Merchant Maiden Hospital, were diverted for educational purposes by the Merchant Company in 1870, under the Endowed Institutions (Scotland) Act. The city is largely resorted to for the sake of education. Besides the University, High School, Academy, Fettes College, Edinburgh Institution, Collegiate Institution, and Merchant Company's Schools, there are many lesser schools of a superior kind.

E. has no manufactures of importance. The printing, publishing, and book trade may be called its staple industry; but brewing, iron-founding, and coach-building are largely carried on. There are also large india-rubber and vulcanite works, a number of tanneries, and an increasing trade in jewellery. The city is the centre of the railway and banking systems of Scotland, and its beauties and associations attract a constant stream of visitors. It returns two members to Parliament.

The society of E. is composed more largely of the learned professions than that of almost any other city. The clergy, lawyers, physicians, teachers, artists, and authors form a very considerable section of its population; and though not the commercial, it is undoubtedly the ecclesiastical, legal, and literary centre of Scotland. See Arnot's *History of E.* (1 vol. 1779); Chambers' *Traditions of E.* (1824); and Wilson's *Memorials of E. in the Olden Time* (Edinb. Thos. C. Jack, 1874).

Edinburgh, University of, was founded by royal charter of James VI. in 1582, and obtained the rights and privileges of the other universities in the kingdom by an Act of the Scottish Parliament passed in 1620. At first there was only one teacher, named a regent, who instructed the students in Greek, logic, metaphysics, moral philosophy, and natural philosophy; but the number of chairs gradually increased, a Professor of Divinity being appointed in 1620, and a Professor of Medicine in 1685, until now there are above thirty different Professors. By the Universities Act of 1858, the privileges of the University were increased, its government was transferred from the Town Council to the Senatus Academicus, and arrangements were made for an improved course of study. The University is a corporation, including a Chancellor, elected for life by the General Council, who is head of the University; a Rector, elected for three years by the votes of the students; the Principal, appointed for life by the curators; the Professors, registered graduates, alumni, and matriculated students. Gladstone, Carlyle, Lord Moncrieff, Sir William Stirling-Maxwell, have, in succession, held the rector-

ship, to which Lord Derby was appointed in 1874. The superintendence and control of the teaching and discipline, the revenues and property of the University, are intrusted to the Senatus Academicus, formed by the Principal, who is President, and all the Professors. The University consists of four Faculties :—(1) The Faculty of Arts, the earliest founded, in 1582, embracing the chairs of humanity, Greek, mathematics, logic and metaphysics, moral philosophy, natural philosophy, rhetoric and English literature—attendance on which is indispensable for the degree of M.A., and the chairs of history, astronomy, agriculture, music, Sanskrit, civil engineering, geology, and political economy. (2) The Faculty of Medicine, founded in the early part of the 18th c., although several medical chairs were instituted in the 17th c., comprising the chairs of botany, institutes of medicine, practice of physic, anatomy, chemistry, midwifery, natural history, materia medica, clinical surgery, medical jurisprudence, surgery, and general pathology. (3) The Faculty of Law, founded in 1707, comprehending the chairs of public law, civil law, constitutional law and history, law of Scotland, medical jurisprudence, and conveyancing, attendance on which is required for the degree of LL.B. (4) The Faculty of Theology, founded in 1720, containing the chairs of divinity, Hebrew, ecclesiastical history, Biblical criticism. The E. U. grants the degrees of Master of Arts—Bachelor of Arts being now abolished—Bachelor of Medicine, Master in Surgery, Doctor of Medicine, Bachelor of Divinity, Doctor of Divinity, Bachelor of Laws, Doctor of Laws, Bachelor of Science, and Doctor of Science. In the session 1875–76 there were 765 students in the Faculty of Arts, 765 in the Faculty of Medicine, 328 in the Faculty of Law, and 58 in the Faculty of Theology, the total number being 2084. During the fifty years before 1826 there were only 168 graduates in Arts; up to 1850 the average number of such graduates was only ten yearly. Now the annual number of graduates has very largely increased, 74 having passed all the ordinary examinations for the degree of Master of Arts in 1875–76. The University Library, which originated in a bequest of about 300 volumes by Clement Little, an Edinburgh citizen, in 1580, now contains about 138,000 printed volumes, and about 700 volumes of MSS. The museums in connection with the University are the Natural History Museum, the Anatomical Museum, the Botanical Museum—at the Botanic Gardens, Inverleith Row—and the small museums attached to several of the scientific classes. The students' debating societies comprise the Dialectic, Diagnostic, Scots Law, Philosophical, and Philomathic Societies. There are above 100 bursaries and scholarships, belonging principally to the Faculty of Arts, ranging in annual value from £5 to £160, open to competition among the students. To provide for the increase of attendance at the University, steps are being taken to erect near the New Infirmary complete class-rooms, &c., for the use of the Medical Faculty, to improve the existing accommodation, and to build a University Hall for public ceremonials. Among the distinguished men who have been Professors in E. U. are Dugald Stewart, Adam Ferguson, Thomas Brown, Sir William Hamilton, David Hume, John Erskine, William Cullen, Joseph Black, James Syme, and William Aytoun. The E. U. has always been famous for its medical school, which has for long attracted students from other countries by the fame of its Professors and the excellence of its teaching. It is at present unsurpassed by any medical school in Britain or the Continent.

Edinburgh Review, a celebrated critical and political journal, the earliest of the large quarterlies, and the first great expositor of Whig principles. The opening number was published on the 10th of October 1802. The idea of the *Review* originated with Sydney Smith; but Francis (afterwards Lord) Jeffrey became editor; and with them were associated Horner, Brougham, John (afterwards Lord) Murray, and Dr Thomas Brown. Among the names of later contributors are those of James Mill, Hallam, Sir William Hamilton, Hazlitt, Macaulay, and Carlyle. The projectors of the *Review* found a publisher in Constable—'to whom,' says Lord Cockburn in his *Memorials*, 'the literature of Scotland has been more indebted than to any other bookseller.' The largest circulation attained by the *E. R.* was 13,000 copies in 1813; and Jeffrey, as editor, received at first £50, and afterwards £200, for each number. The literary criticisms of the *Review* were often prejudiced, but always able. Its fame, however, stands highest as a political organ. The Whig party certainly owed in great measure its subsequent brilliant triumphs to the persistent and consistent help it received from the *E. R.* See Cockburn's *Life of Jeffrey*.

Edinburghshire, or **Midlothian,** a county in the E. of Scotland, bounded N. by the Firth of Forth, N.E. and E. by Haddingtonshire, S. by Peeblesshire and Lanarkshire, and W. and N.W. by Linlithgowshire. It stretches from E. to W. 36 miles, and from N. to S. 18 miles, and covers an area of 367 sq. miles, or 1,254,926 acres. The surface is undulating and hilly, the chief ranges being the Moorfoots (highest point 2136 feet) in the S.E., the Pentlands (highest point 1839 feet) in the centre. There are also several isolated hills in the W., and Corstorphine Hill and Arthur's Seat near Edinburgh. The principal rivers are the Gala, which flows into the Tweed, the N. and S. Esk, which unite and enter the Firth of Forth at Musselburgh, the Water of Leith, which falls into the sea at Leith, and the Almond, which separates E. and Linlithgowshire. E. consists mostly of coal-measures, with trap in the Pentlands and Lower Silurian in the S.E. A great coal-bed, 15 miles long by 8 broad, runs between Cairops and Musselburgh. There is much moorland in the south, but E. is in general fertile, well wooded and watered, and under peculiarly skilful and careful cultivation. The chief manufacture is paper; limestone and sandstone are largely quarried; coal and ironstone are extensively worked, and there are valuable herring-fisheries on the Firth of Forth. E. is traversed by the North British and Caledonian railways, and connected with Glasgow by the Union Canal. The chief towns are Edinburgh, the capital; Leith, the only large port in the county; Dalkeith, Roslin, and Pennycuik, inland; and Musselburgh, Portobello, Granton, and Newhaven on the Firth of Forth. Pop. (1871) 328,379. E. returns one member to Parliament. E. formed part of the old English kingdom of Northumbria, and of the old earldom of Lothian.

Ed'monstone, formerly an island at the mouth of the Hooghly, Bay of Bengal. Formed by alluvium, it was made a marine station in 1820, but has since been swept away by the sea.

Ed'monton, a village in Middlesex, 7½ miles N.N.E. of London, with a trade in timber, carried on by means of the river Lea. E. is the burial-place of Charles Lamb, and the 'Bell at E.' acquired celebrity from its having been mentioned by Cowper in *John Gilpin*. Pop. of parish (1871) 13,860.

Edmund Ironside. See EADMUND.

Edmund's, St, Hall, Oxford, named after St Edmund, Archbishop of Canterbury in the time of Henry III. In 1557 it came into the possession of Queen's College, and this society procured an Act of Congregation vesting in itself the perpetual right of nominating the principal, who appoints to exhibitions, of which there are now ten, of the yearly value of £30 each, restricted to students designed for the Church. In 1763, George Holme, D.D., some time Fellow of Queen's, bequeathed £1000 to the University in trust, to apply it, with accumulated interest, to the purchase of the advowson of a living, to which the principal of St E.'s H. should be presented. The advowson of Gatcombe was purchased in 1821, to which the University first presented in 1844. In 1875 there were thirty-three undergraduates, forty members of convocation, and 136 members on the books.

E'dom (Heb. 'red') was the territory of the descendants of Esau. Down to the time of the Captivity, E. is synonymous with Mount Seir, *i.e.*, the narrow mountainous tract extending from the Dead Sea to the head of the Gulf of Akaba, its capital being Bozrah, and its seaports Elath and Eziongeber. David added Mount Seir to the kingdom of Israel; but as the power of the kingdom of Judah declined, the Edomites extended their power to the N.W., and at last encroached on the territory of Judah as far as Hebron; while their original territory was taken possession of by the Nabathæan Arabs. In the later Jewish and Roman history, E., now called Idumæa, was composed of the southern part of Judæa and a part of Arabia Petræa extending S.E. from the Mediterranean to the W. side of Mount Seir. Roman writers after the Augustan age use 'Idumæa' and 'Judæa' as synonymous, and soon after the destruction of Jerusalem the name disappears from history, and is merged in that of Arabia.

Edriophthal'mata (Gr. 'sessile-eyed'), the name given to a group of *Crustacea* (q. v.), in which the eyes are not supported

on stalks (*Podophthalmata*). To the E. belong the three orders *Læmodipoda* (whale-lice), *Isopoda* (wood-lice), and *Amphipoda* (sandhoppers). In E. a Carapace (q. v.) is rarely developed, and the head is usually separate and distinct from the body. The adult E. possess seven pairs of feet. Another character of E. is found in the fact that the mandibles or principal pair of jaws often possess *palpi*, or feelers. The eyes may be either simple or compound, and are situated in the sides of the head.

Edri'si, El, Abu-Abd'allah-Mohammed, a famous Arabian geographer, was born at Septa (mod. *Ceuta*) in 1099, studied at Cordova, lived at the court of Roger II., King of Sicily, and died between the years 1175 and 1186. He had deepened a strong predilection for geography by wide travels, and had thus amply fitted himself for the task to which he was subsequently appointed by the Sicilian monarch. This was to prepare a globe that would embody recent observation and discovery. To collect material from various travellers and from remote corners of the world was the labour of fifteen years. But at last the globe, of pure silver, was completed, and his description of it forms the still more valuable and enduring work *Nushat-ul-Mushtâk* (1153), which was first and badly translated into Latin by Sionita and Hesronita (Par. 1619). Many editions have appeared of isolated parts, as *Spain*, by Conde (Madr. 1799); *Africa*, by Hartmann (Gött. 1796); *Syria*, by Rosenmuller (Leips. 1828), &c. A copy of the complete work was issued in French (2 vols. Par. 1837-40).

Educa'tion (Lat. *educo*, 'I draw out'), in its widest sense, means the drawing forth or development of the varied capacities of man's nature. The term, however, is more generally applied to the formal methods and processes by which, in time of youth, this development of the powers of man is promoted in harmonious relations and with beneficial results. E. is thus threefold, as it regards respectively the body, with which man toils; the mind, with which he thinks; and the character, in the spirit of which he lives. Physical E. treats of the laws that regulate and the exercises that develop the growth of the bodily frame, and fit it for the healthy discharge of its different functions, and includes a knowledge of human physiology and the laws of health. Intellectual E. must be carefully adapted to the strength of the mind, and to the stage of growth which it has reached; and as the chief agent in this department is the communication of knowledge, the educator must ever be on the alert to determine the most suitable subjects of study, and the best means of obtaining through them the desired educational results, and especially to guard against instruction degenerating into the mischievous process familiarly known as 'cramming.' Intellectual E. may also be viewed in the light of the various courses of study that are provided for pupils, according to the period of time during which they will be under instruction, and that are represented by primary schools, secondary schools, and universities. Recent political and economic movements have given a strong impetus to primary E. throughout the civilised world, legislators having come to see that through national E. alone will the masses be enabled to govern themselves wisely, and adequately to hold their own in the great industrial struggle for pre-eminence among the nations. This new interest in E. has manifested itself in measures that seek to ensure, by compulsion if requisite, the school attendance of every child, and to improve at once the status and the professional equipment of the teacher. The main educational work of the primary schools must always consist of reading, writing, and ciphering, although in some countries—*e.g.*, in Scotland—these schools have been honourably conspicuous for their maintenance of higher subjects of study. The secondary schools have long been the battle-ground of many important educational controversies. At one time the chief subject of dispute was the relative educational value of classical and mathematical instruction, but this question has now been so widened as to include a consideration of the claims of science and of modern languages, particularly of our own. Signs are not wanting that the indiscriminately polemical spirit is dying out, and that the programme of higher scholastic study will be rearranged in accordance with the changed necessities and demands of modern times. The universities have also of late been the subject of much controversy and the scene of many changes; and one of the most difficult educational problems is how to bring the secondary schools and the universities into such relations that both may discharge their proper functions most effectively. In the E. of the emotions and the will, scholastic training holds a comparatively subordinate place; for although the teacher may effect much good, both by the example he sets and by the spirit he awakens, each individual must necessarily be exposed from youth upwards to the multifarious influences that make or mar the character of man. See *A System of Physical Education*, by A. Maclaren (the Gymnasium, Oxford, printed at the Clarendon Press); Huxley's *Lessons in Elementary Physiology* (Macmillan); Beneke's *Elements of Psychology* (Parker); Herbert Spencer's *Essays on Education* (Williams & Norgate); *Modern Culture*, edited by Dr Youmans (Macmillan); *Essays on a Liberal Education* (Macmillan); Quick's *Essays on Educational Reformers* (Longmans); Donaldson's *Lectures* (Black); *The Education of Girls*, by Professor Hodgson; *The Free-School System of the United States*, by Adams (Chapman & Hall); Von Raumer's *Geschichte der Pädagogik* (4 vols. Stutt.).

Education Societies, Laws Affecting.—The 6 and 7 Vict. c. 36 exempts from all local rates land and buildings belonging to any society for the purposes of science, literature, or promotion of the fine arts, if supported wholly or partly by annual voluntary contributions, and which does not pay any dividend or bonus to the contributors. 17 and 18 Vict. c. 112 gives legal facilities to these societies and to educational societies for procuring sites and buildings, and for settling them in trust.

Grammar-Schools.—In 1840 an Act was passed for improving the condition and extending the benefit of grammar-schools, defined as all endowed schools, whether of royal or other foundation, founded or maintained for teaching Latin or Greek. The intention of the founders is to be considered, and Latin and Greek may be dispensed with when the revenues are insufficient.

Sites for Schools.—By 4 and 5 Vict. c. 38 it is enacted that landlords who have an estate in Fee (q. v.), or in tail, or an estate for life—but in the two latter cases only with the consent of the person next in the remainder, if he be legally competent—being possessed of the beneficial interest, may give, sell, or exchange land, not exceeding an acre, as a site for a school to educate poor persons; and the rights of all persons in waste or common land conveyed for this purpose by the lord of the manor are barred.

Education under the Poor Law.—By 7 and 8 Vict. c. 101, and subsequent amending Acts, the Poor Law Commissioners may combine unions or parishes into school districts for any class of infant poor not above the age of sixteen, being orphans or deserted by their parents, or whose parents consent to the placing of the children in the district schools.

Reformatory and Industrial Schools.—The laws relating to these schools were consolidated and amended in 1866. Any offender under sixteen years old who is convicted summarily of an offence punishable with penal servitude or imprisonment, and who is sentenced to imprisonment for not less than ten days, may be sent by the justices before whom he is charged to a certified reformatory school, to be there detained for not less than two or more than five years; and the justices are bound to select a school conducted as nearly as possible according to the religious persuasion to which the offender appears to belong.

Elementary Education.—In 1870 an Act was passed to provide for public elementary E. in England and Wales. A public elementary school is defined by the Act to be one at which E. is principally elementary, and at which the charge for ordinary instruction does not exceed ninepence per week for each scholar. The object of the Act seems to be to provide and maintain sufficient schools, and to compel children who would not otherwise receive efficient education to attend them. Fees of scholars, the parliamentary grants, and moneys raised by loan, form the school fund. Any deficiency is to be supplied by rating. No parliamentary grant is to be made to any school board on account of instruction in religious subjects. Every child in good health who is not receiving sufficient instruction in some other manner, and who is between the ages of five and thirteen, can be compelled to attend a public elementary school, if there is one within three miles of its residence, and the school board has power to impose a fine, recoverable summarily, not exceeding five shillings, with costs, for breach of this rule. In Scotland, under the E. Act of 1872, parents are now obliged to send their children to school, when there is one within three miles of their residence, under penalty of fine or imprisonment in case of failure. Every public school subject to inspection and in

receipt of public money is open to children of any religious persuasion. The jurisdiction of presbyteries and of Church courts in Scotch schools is abolished, and transferred to the parochial school boards, these being amenable to the chief board, resident in Edinburgh.

Edur', a Rajpoot state of India, the foremost of the Myhee Caunta group, in political relation with the Bombay Government, is situated to the N.E. of Baroda. Area unascertained, but about 323 square miles are under cultivation; pop. (1872) 217,382. The net revenue is £25,000, but as much more is absorbed by eight great feudatories and eighteen lesser nobles. E. is tributary to the Gaikwar, paying annually £3040. An agreement with the British was signed in 1820. The present prince, who succeeded in 1869, is now (1876) a minor of fifteen years of age. He is being educated by an English tutor, and the government is conducted by the political agent. The town of E. (pop. 10,000) is the residence of the Raja, but otherwise a place of no importance.

Edward the Confessor. See EADWARD.

Ed'ward I., King of England, the eldest son of Henry III. and Eleanor of Provence, was born at Westminster, 16th June 1239. After some suspicious intrigues, E. finally sided with his father against the nobles in that struggle called the Barons' War. He shared in the defeat at Lewes (1264), but afterwards overthrew the Earl of Leicester and his party at Evesham (1265). In 1270 he left England to join in the last Crusade; and in 1272, while returning from the Holy Land, heard of his father's death. E. reached England in 1274, and was crowned in that year, together with his consort Eleanor, the daughter of the King of Castile. E.'s first work as sovereign was the subjugation of Wales. The Welsh princes had been deeply involved with the barons' party against Henry III., and soon after Edward's succession Prince Llewelyn's refusal to do homage forced on a war, which was ended by the defeat and death of that prince in 1282. The King then thoroughly reduced the country, introduced English customs, and settled the confiscated lands on his nobles. Having thus welded together England and Wales, E. bent his mind to the union of England and Scotland. In the previous history of the two countries, there had been authentic instances of homage done by the Scotch monarchs to the English. This furnished a ground for E.'s claims; and the death of the Maid of Norway (1290) gave him an opportunity for their assertion. In 1291 he was chosen arbitrator by the thirteen competitors for the Scottish crown. The claims of these were finally narrowed down to a choice between two—John Baliol, Lord of Galloway, and Robert Bruce, Lord of Annandale. E., who was formally acknowledged feudal superior of Scotland, decided in favour of the former. The decision was given at Berwick, November 17, 1292; and next day Baliol swore fealty to the King. The indignities heaped upon him, and the outcry of his people, soon compelled the Scottish sovereign to declare war on England. E. marched into Scotland in 1296, sacked the town of Berwick, made Baliol prisoner, proclaimed Scotland his fief, forfeited to him in consequence of her king's treason, placed garrisons in the principal towns, and appointed English governors over the country. William Wallace (q. v.) headed a revolt of the Scottish party in the spring of 1297; defeated Warrenne, Edward's regent, at Stirling in the summer of the same year; ruled Scotland for a brief space; and then at Falkirk, in 1298, was conquered by an army which E. led in person. The country was not yet, however, wholly subdued; the nobles, aided by France and led by Bruce and Comyn, still resisted. In 1305 E. again invaded Scotland, the castle of Stirling surrendered, and he was master of the land. Wallace was captured, and executed at London. In the next year Robert Bruce appeared as leader of the national party. He was crowned at Scone on March 27, 1306, and the rising of Scotland followed. The news roused E., now an old man, to terrible fury, and he resolved on immediate invasion. Having gathered a great army, he marched north, but died July 6, 1307, at Burgh-on-Sands, near Carlisle, when his foot was almost on the Scottish frontier.

The name of E. is an outstanding one among English sovereigns. His character was marked by iron strength and most politic sagacity. An imperious temper was relieved by generous impulses; he was cruel, and yet forgiving; vindictive, and yet merciful. As a soldier E. had no rival, and he possessed the art, so valuable to a general, of attaching to himself the personal devotion of his men. Of English kings, E. first recognised and respected the existence of an English national spirit. By his judicial reforms he gained for himself the title of the 'English Justinian;' in his reign the Court of Chancery and justices of the peace took their origin. Under his rule, if not fostered by him, can be first seen the English Parliament in something like its present shape. A greater respect for law can also be dated from E.'s reign; and this was largely due to the example of the King. His imperial policy has often been called by harsh names, and viewed in a wrong light. It was not one of vulgar aggrandisement, dictated by mere ambition; but one of annexation, to end in union. E. saw further and clearer than any politician of his time that the French dominions of England were lost, and his aim was to consolidate the whole island of Britain into one kingdom. Wales he united to England. Hence his strenuous attempt to annex Scotland—an attempt which, if successful, might have anticipated by four centuries the ultimate benefits of the Union. See Freeman's *Essay on the Relations between the Crowns of England and Scotland* (*Essays*, 1st series, 1872). Palgrave's *Documents and Records illustrating the History of Scotland* takes a similar view. See also Green's *History of the English People* (1875), and for the Scottish view of E.'s character and conduct, Burton's *History of Scotland* (2d ed. 1873).

Edward II., son of the preceding, was born 25th April 1284, and was called E. of Caernarvon from his birthplace. He was the first of English royal heirs-apparent to bear a title taken from the Principality, being created Prince of Wales in 1301. E. succeeded to the throne at the age of twenty-three, but even then seems to have selected a line of policy—to loose himself from the dominance of the barons. To this end he filled the great offices of state, not with English nobles, but with men of lower rank and alien birth. A passion for favourites also inclined him to this conduct. Piers Gaveston, a Gascon, was created Earl of Cornwall, and placed at the head of affairs. The barons demanded and obtained his banishment; and when he returned, the Earl of Lancaster had him executed in 1312 on Blacklow Hill, near Warwick. While these troubles weakened E.'s power at home, his arms were unsuccessful in Scotland. Bruce and his party rapidly made head, and after a seven years' struggle reconquered from the English all but the castle of Stirling. E. resolved to march to its relief, and raised an immense army, composed of 30,000 disciplined horse, and vast numbers of wild Welsh and Irish. At Bannockburn (June 24, 1314) the great force was utterly routed; and henceforth Scotland was free from English supremacy. Just after this disgrace, E. became infatuated with another favourite, Hugh le Despenser, who was made Earl of Glamorgan. Lancaster and the barons, at once becoming jealous, entered London with their troops in 1321, and had Despenser and his father driven into exile. But E. in the next year took vigorous measures, defeated Lancaster in Wales, executed him at Pontefract, and recalled his favourite. He then concluded a truce for fourteen years with King Robert of Scotland; but this act destroyed the popularity which his mastery of the barons had won him. His queen, Isabel, went to France with her son in 1325, ostensibly to conclude a treaty; she refused to return, and intrigued there with the exiled barons, the chief of whom was Roger Mortimer. She landed with a hostile force in 1326 at Orwell, in Suffolk, having the young Prince with her, and the King was abandoned by every one. Being taken along with his favourite, Despenser was hung, and E. himself deposed at Kenilworth, and murdered at Berkeley Castle, 20th September 1327. See Green's *History of the English People* (1875).

Edward III., son of the preceding, was born at Windsor, 13th November 1312, and began to reign in 1327. The government was at first administered by a regency, but in 1330 E. caused Mortimer, the real head of affairs, to be executed at Tyburn, and assumed full kingly authority. In 1328 he married Philippa of Hainault. In 1332, Edward Baliol having dethroned David Bruce of Scotland, and being unable to preserve his usurped crown, obtained assistance from E. The Scotch were defeated at Halidon Hill, 19th July 1333; Baliol was restored, and Berwick annexed to England. E. was now diverted from the Scottish to the French war, in regard to which he has been greatly misrepresented. The contest was forced on him by Philippe of Valois, who desired to seize E.'s duchy of Aquitaine, which had never belonged to the kings of Paris. E., anxious to avoid a struggle,

placed Guienne in Philippe's hands for forty days; and when Philippe refused to restore it, war was inevitable. E.'s claim to the French throne through his mother Isabel was palpably untenable, French law excluding female succession to the crown; and was probably advanced to win over the Flemish allegiance. After several years of undecisive campaigning, E. invaded France with 30,000 men, and on August 26, 1346, overthrew a vastly superior French army at Cressy, where his son, the Black Prince, displayed brilliant valour and slew the King of Bohemia, and where the English archery told with fearful effect upon the French, who left above 30,000 dead on the field. The battle was as severe a blow to feudalism as to France, because it proved the superiority of yeomen on foot to the most splendid chivalry. Other successes followed. In October 1346 David of Scotland was defeated and captured at Neville's Cross; Calais surrendered in 1347. At an earlier date (June 24, 1340) the naval victory off Sluys made the English masters of the sea. While E. returned home and repelled a Scottish invasion, the Black Prince ravaged central France, and on the 19th September 1356 won a glorious victory at Poitiers with 8000 against 60,000 men, and carried Jean, Philippe's successor, captive to London. France, torn by foreign and intestine strife, seemed hopelessly crushed, but E. was weary of war. The constant need of supplies caused him to summon frequent Parliaments, the influence of which steadily increased. Peace was made by the treaty of Bretigny in 1360, E. resigning his claim to the French crown and retaining Guienne, Poitou, Calais, and Guisnes. E. reaped no lasting good from his victories. 'England,' says Mr Freeman, 'was successful in battles, but she was thoroughly beaten in war.' In 1369, Charles, King of France, renewed the struggle; the English were driven step by step from their Continental possessions, and E.'s reign closed in gloom. His last years were embittered by the caprices of his mistress, Alice Perrers, and by the unpopularity of his administration. But the 'Good Parliament' of 1376, supported by the Black Prince—conduct which redounds more to his honour than Poitiers—attacked the abuses of the royal government, and carried several admirable reforms before E.'s death in 1377. E.'s reign is more important for its social and religious changes than for the victories with which it is ringing. It was a time in which, while Norman and Saxon were rapidly blending, while Chaucer was founding a new literature and Wycliffe heralding a religious revolution, English law was taking definite and potent form, the spirit of resistance to arbitrary power was gaining strength and courage, and scholasticism, chivalry, feudalism, and the temporal authority of the Church were fast passing away. See Freeman's *Essay on Edward III.* (*Essays*, 1st series, 1872), Kitchen's *History of France* (1873), and Green's *History of the English People* (1875).

Edward IV., second son of Richard Duke of York, was born at Rouen, April 29, 1441, and during the lifetime of his father bore the title of Earl of March. On the defeat of York at the battle of Wakefield Green, 21st December 1460, and his subsequent execution by the successful Lancastrians, E. assumed the claims of his father, and marched on London, routing on his way the Lancastrians at Mortimer's Cross. He was declared king March 3, 1461. On the 29th of the same month his claims received a bloody sanction by a great victory over the forces of Queen Margaret at Towton, in Yorkshire. A year after the battle of Hexham, in 1464, Henry VI., who had been in hiding, was betrayed and imprisoned in the Tower. E., who was popular in London on account of his courage, beauty, and winning manners, reigned secure until his marriage, first private and then avowed, with Elizabeth Wydevile, the widow of Sir John Grey, and his conferring honours upon her relatives, offended his chief partisan, the Earl of Warwick, the 'King-maker.' The latter, for the time aided by the Duke of Clarence, entered into a conspiracy against E., and by a surprise forced him to flee to France in 1469. Henry was replaced on the throne, but E., having obtained help from Charles the Bold of Burgundy, landed in England at Ravenspurne, 14th March 1471, and on the 14th of April routed the forces of Warwick at Barnet, the King-maker himself being among the slain. The next month (4th May) he almost destroyed the forces of Margaret at Tewkesbury. Margaret and her son Edward were captured. The Queen was imprisoned, her son was murdered, and Henry himself was in a day or two found dead in his bed in the Tower, the suspicion being that he was assassinated by Richard Duke of Gloucester, the third brother of E. E. reigned undisturbed till his death, April 9, 1483. Although he has an evil reputation for his debaucheries, he was an able and powerful ruler. He founded the Absolute, or, as now styled, New Monarchy, which lasted till the end of the Tudor line. During his reign the silk manufacture is said to have been introduced into England, and in 1476 William Caxton set up his printing-press in England. See Green's *History of the English People* (1875).

Edward V., eldest son of Edward IV., was in his thirteenth year when his father died. What is called his reign lasted from 9th April to 22d June 1483. His uncle, Richard Duke of Gloucester, contrived to obtain possession of his person, as also that of his younger brother, the Duke of York, and got himself made protector. The young princes were then thrown into the Tower, and they disappeared, the belief being that they were murdered by Richard's orders. See Green's *History of the English People* (1875), and Sir Thomas More's *Life of Edward V.*

Edward VI., the only son of Henry VIII., by Jane Seymour, was born at Hampton Court, 12th October 1537. He was only ten years of age when he succeeded to the throne, and he died before attaining his majority. E. was well educated; he gave promise of high and pure character, and in religion had a strong Protestant bias. During the early part of his reign the kingdom was administered by his uncle, Lord Hertford, who had been appointed by Henry VIII. president of a council of regency, and under the title of Duke of Somerset became Protector or guardian of the kingdom. During Somerset's regency, the Scotch, who refused to marry their young queen Mary with E., were defeated at Pinkie (September 15, 1549), and vigorous efforts were made to establish Protestantism. The Six Articles were repealed; priests were allowed to marry; a new service-book, now known as *The First Prayer-Book of Edward VI.*, was drawn up; and Roman Catholic clergy who refused to submit to the changes were persecuted. The result was insurrection, which Somerset put down, but through the influence of Dudley, Earl of Warwick, he was himself deposed and executed, 22d January 1552. Dudley was made Duke of Northumberland, and favoured the party of Cranmer, which, among other measures, introduced the Forty-Two Articles of Religion, now reduced to the Thirty-Nine Articles of the Church of England. Under Northumberland's influence E. made a will, which he had no right to do without the consent of Parliament, excluding Mary and Elizabeth, the two daughters of Henry VIII., as being illegitimate, from the throne, and vesting it in Lady Jane Grey, descendant of Mary, younger daughter of Henry VII., whom he had married to his son, Lord Guildford Dudley. E. shortly after this arrangement died at Greenwich, July 6, 1553. See Froude's *History of England*, vols. iv. and v.; Haymond's *Life of E. VI.*; E.'s own *Journal* in Holinshed's *Chronicle*; and Green's *History of the English People* (1875).

Edwardes, Sir Herbert, a distinguished lieutenant of the Lawrences in their administration of the Punjaub, and a hero of the Indian Mutiny, was born 12th November 1819. In 1857 he was Commissioner of Peshawur, perhaps the most important military post in India, where he not only maintained order throughout the Sepoy war, but was able to send down reinforcements, both of Europeans and staunch native troops, to the camp before Delhi. To him, as much as to any single man, was due the tranquillity of the Punjaub in this crisis, and thus directly the safety of India. He died in England, 23d December 1868.

Edwards, Jonathan, a celebrated American divine and metaphysician, was born at Windsor, Connecticut, October 5, 1703. He was the son of the Rev. Timothy E., for sixty-three years pastor of Windsor. E. entered Yale College in 1716, and took his degree of B.A. September 1720, standing highest in his class. He studied there two years more, was licensed, preached a few months in New York, and in September 1723 became tutor in Yale College. On February 15, 1727, he was ordained colleague to his grandfather, in Northampton, Massachusetts. Here he laboured for twenty-three years, his church being stirred with memorable revivals in 1735 and 1740. In the full tide of his success a difference sprang up between him and his church. He held that conversion should be the term of communion. But the alienation began in 1744, when, on learning that some young members had been reading obscene books, he

made their names public and called for discipline. He was dismissed in 1750, most of the people turning against him. In 1734 E. and other ministers in his county originated the Indian Mission at Stockbridge. They gave both money and influence in its support, receiving in 1739 from the Colonial Government a grant of 4000 acres, as compensation, near Stockbridge. Here E. began to preach in January 1751. In this Arcadian retreat he found time to pursue his favourite studies. The room is still pointed out where, in about four months, he wrote *The Freedom of the Will* (Boston, 1754), the most famous of all his works, and the ablest defence ever made of the Necessarian doctrine. E. was elected President of Princeton College, and installed February 16, 1758. Smallpox being prevalent, he was inoculated, but died from the effects, March 22, 1758. E. has stamped his theology indelibly upon New England character. A close student, a clear logician, and a profound thinker, he must ever rank among the great fathers of the Church. In spite of his rigorous, one may say pitiless, Calvinism, he was benevolent, gentle, and devout to a degree rarely seen on earth. Among his other works are *Revival of Religion* (Bost. 1742); *Religious Affections* (Bost. 1746); *Life of Brainerd* (Bost. 1749); *Original Sin* (Bost. 1758); *History of Redemption* (Edinb. 1777); *Nature of Virtue* (Bost. 1788). An edition of E.'s works was published at Worcester, Mass., in 8 vols., in 1809, and another in 10 vols., in 1829. See S. E. Dwight's Memoir of E., prefixed to his works (10 vols. 1830, Lond. ed. 2 vols. 1834).—**Jonathan E., D.D.**, son of above, was born 1745. He was likewise a distinguished theologian, became President of Union College, Schenectady (1799), and died August 1, 1801.

Ed'win. See EADWINE.

Eecloo', a town of E. Flanders, Belgium, 10 miles N.W. of Ghent, and 15 miles S.S.E. of Bruges, on the railway between these places. It has large manufactures of cotton, wool, tobacco, soap, leather, salt, and oil. Pop. (1873) 9564.

Eekairee' (Akhari), a semi-ruined city in the province of Mysore, British India, 162 miles N.W. of Seringapatam. It was the capital of a powerful state in the 17th c.

Eel, a name given indiscriminately to fishes with elongated bodies, but restricted to certain genera of Teleostean fishes belonging to the section *Apoda* of the sub-order *Malacopteri* ('soft - finned'). The term *Apoda* indicates the absence of the *ventral* fins. The E. has soft fin-rays, and a swimming bladder communicating with the throat by a *pneumatic duct*. The body is covered by minute detached scales, which are frequently concealed by the skin. The lateral line of mucous canals exudes a large quantity of *mucus*, which protects the body in the absence of scales. The best-known families of eels are the *Anguillidæ*, *Murænidæ*, *Congeridæ*, and *Gymnotidæ*. The first family has comb-like teeth, the gill-openings being lateral. To this family belongs the sharp-nosed E. (*Anguillula acutirostris*), and the broad-nosed E. (*A. latirostris*). The *Muræna Helena*, or 'mottled muræna,' exemplifies the second family, in which there are no pectoral fins, and the gill-openings are represented by mere slits. A single row of teeth exists on the nasal bone. The murænæ formed the famous 'eels' of the Romans. The *Congeridæ* are represented by the Conger (q. v.) (*C. vulgaris*), and are distinguished by the dorsal fin commencing close to the head, and by the absence of scales. The nostrils are in front of the snout, and teeth exist on the palate and vomer. The *Gymnotidæ* are represented by the *Gymnotus electricus*, or electric E. of S. American rivers. This genus has no dorsal fin or scales, but possesses a long anal fin. Other eels are the 'glass-E.,' or *Leptocephalidæ*, so named from their translucent bodies. The hair-tailed glass-E. (*Tilurus trichurus*) inhabits the Mediterranean Sea, as does the pig-nosed species (*Hyoprorus Messinensis*). The name sand-E. is applied to the *Ammodytes Tobianus*, or hornels, and also to the sand-lance (*A. lancea*).


Eel.

The true eels are well-known fishes, celebrated for their voracious nature, and for their tenacity of life. They occur in both salt and fresh water, and are esteemed by many as articles of food, although the flesh is rather fatty and insipid. Eels are largely captured in Holland, and are brought alive to England in 'welled' boats. They are captured in Britain and abroad by means of 'E.-pots' or 'bucks,' wicker cages fixed usually near weirs in rivers, and also by lines baited with worms, minnows, or other bait. Spearing eels is chiefly practised in winter, whilst the eels lie in the mud.

Eel-Pout, a term applied to the Burbot (q. v.), and also to the viviparous Blenny (q. v.).

Eels (in paste and vinegar). These minute organisms are Nematoid worms belonging to the *Nematelmia* (*Scolecida*, q. v.), and to the *Anguillulidæ*. The vinegar eel (*Anguillula aceti*) is a familiar species, and is nearly allied to the *Tylenchus tritici*, which produces Ear-Cockles (q. v.) in wheat. These organisms are free nematoids. They possess rudimentary eyes, and, generally, a posterior sucker. They produce few ova at a time. These organisms appear in vinegar and other fluids, probably from the ova being readily conveyed to and contained in such fluids.

Efen'di, or **Effen'di**, a title of honour among the Turks conferred upon persons occupying recognised positions in the civil service or in social life. The title is frequently affixed to the name of the office which the person holds, as *Hakim-E.*, the Sultan's first physician. The corresponding military title is *Aga*.

Effaré, or **Effrayé** (Fr. *effarer* or *effrayer*, 'to frighten,' the former being derived from the Lat. *efferare*, 'to look wild;' the latter from *exfrigidare*, 'to freeze with terror'), an heraldic term, applied to an animal rearing as if scared or enraged.

Effoirs', or **Effeir'ing**, is a Scotch law-term signifying corresponding to or relating to. *In form as E.* means 'in legal form.'

Eff'erent Nerves. See NERVE and REFLEX ACTION.

Efferves'cing Draughts. See AERATED WATERS.

Eff'igy (Fr. *effigie*, Lat. *effigies*, 'an image'), an image or likeness in painting, sculpture, or drawing. It is not, however, a word recognised in art; and in common use it signifies such a caricature semblance as at once manifests and stimulates contempt for the person who is the subject of it. To hang or burn a person *in E.*, is to hang or burn the E. of the person as a sign of contempt for and dislike felt towards him. The practice was much more common in the earlier half of the present century than now.

Eft (Old Eng. *efete*), a name popularly used as synonymous with Newt (q. v.). The Scotch term 'esk' or 'ask' (probably connected with 'asp') is also used as an equivalent to E.

Eg'ode, Hans, the apostle of the Greenlanders, was born January 31, 1681, at Harstad, a village in Nordlandene, Norway. After studying at Copenhagen, he was ordained priest in 1707, and became pastor of Vaagen. His ambition was to go as missionary to Greenland, and, after many hindrances, domestic and otherwise, he sailed for that inhospitable land with his wife and family in 1721, and laboured there for fifteen years with great industry and success. Frederik IV., King of Denmark, aided the mission; and in 1740, after his return to Copenhagen, E. was made a bishop. He died in 1758. E. wrote two works on the subject of his mission, one of which was translated in 1745, under the title *Description of Greenland*.—**Povel E.**, son of Hans, born in Norway in 1708, afterwards Bishop E., translated the Bible into the Greenland tongue, and compiled a dictionary of the same, which appeared in 1750 under the title *Dictionarium Grönlandico-Danico Latinum*, and a Greenland Grammar (1760). He died in 1789.

E'ger, a town of Bohemia, on the right bank of the river E., 90 miles W. of Prague. It has manufactures of cloths, hats, and shoes, and its trade has greatly increased since it became a point of junction for three railways. E. has several churches and educational establishments. The Gymnasium in 1850 was elevated into an Obergymnasium, with eight classes. The town-house contains a painting of the death of Wallenstein, who was assassinated here, 25th February 1634. Pop. (1869) 13,441.—The river E. rises in the Fichtelberg, on the borders of Bavaria, 2240 feet

above the sea-level, flows N.E. and E., and passing Elbogen, Saaz, Birdin, and Theresienstadt, falls into the Elbe, after a course of 195 miles.

Ege'ria, or **Ægeria**, from whom Numa feigned that he had received instructions for the institution of the rites that would be most acceptable to the gods, was the most celebrated of the four Camenæ, or prophetic nymphs, in Roman mythology.

Egg, the name given to the element furnished by the female organs of generation of animals, which represents the female contribution to reproduction, and which, when duly fertilised or impregnated by contact with the male or seminal fluid, is capable of developing into a new organism. The E. is generally named the *ovum* in physiology and zoology, and may be assumed to be represented in every group—even in the lowest—of the animal world. Thus the *nucleus* found in many *Protozoa* (q. v.) either represents the E. or the female organ which gives origin to the equivalent of an ovum. To development (see DEVELOPMENT OF EMBRYO) belongs the description of the changes which eggs undergo in their various stages towards the perfection of the contained embryo. Eggs vary very much in different animals in the relative development of their parts. Every perfect E. consists of a *vitelline*, or outer membrane, of a yolk or *vitellus*, of a *germ* vesicle, and of a *germinal spot*. The E. of a hen, for example, consists of these parts or their equivalents, after impregnation, and of superadded matters (white or albumen, shell, &c.) to protect the essential part of the ovum during its development. Sometimes numerous eggs are deposited at once, or the number may be limited to one or two. The eggs most sought after in commerce are those of Rasorial birds, such as our fowls, turkeys, and their allies; whilst those of turtles are also eaten as a delicacy. The true idea of an E. or ovum is necessary to the comprehension of what is involved in the term *individual*, as used in zoology—an *individual animal* being the *total* result of the *full* development of a *single* E. See REPRODUCTION and OVUM.

Egg, Chemistry of.—Chemically the quantity and quality of the parts of an ordinary hen's E. have been determined as follows:—The entire weight is 1000 grains, of which the *white*, consisting, in 100 parts, of 80 parts water, 15½ parts dry albumen, and 4½ parts salts, &c., weighs 600 grains; the *yolk*, consisting, in 100 parts, of 53¾ parts water, 17½ parts dry albumen, and 28¾ parts oils suspended in the yolk in minute globules, weighs 300 grains; while the shell, consisting of lime, weighs 100 grains.

Egg Trade.—Great attention is now being paid to the rearing of poultry in the United Kingdom. Stimulus was given by the Birmingham show, and the directors of the Crystal Palace have since done much to promote a love of barn-door fowls. But yet home-laid eggs cannot be obtained in sufficient numbers. Imports of eggs, principally from France, are gradually and rapidly increasing. In 1845 only about 70,000,000 were received, in 1860 160,000,000; in the first ten months of 1875, 667,287,360. The value of imported eggs in 1860 was £336,000; in the ten months 1875, £2,280,181. French and Belgian eggs taste of the straw in which they are hampered.

Egg'a, a town of W. Africa, in the Yoruba country, on the right bank of the Niger, a little below the point where it receives the Kudunia. Its length is variously stated at from 2 to 4 miles; the streets are narrow, the houses conical, built of clay, and sometimes stained with indigo. The chief manufacture is a kind of blue cloth, and the chief articles of commerce are calabashes, silk, yams, potatoes, corn, and fish. Pop. uncertain.

Egg-Apple, or **Egg-Plant**, the name given to the edible fruits produced by species of Solanaceous plants allied to the potato. Of these species, *Solanum ovigerum* and *S. melongena* of the E. Indies are well-known examples. In the latter, the plant has a woody stem and attains a height of two feet. The fruit is in shape and size like a hen's egg, and is of white or yellowish colour. These fruits are eaten in the E. Indies.

Egg'ar Moth (*Lasiocampa trifolii*), a species of Lepidopterous insects, the caterpillars of which are found on clover and broom. The adult moth is of a yellowish-brown colour.

Egg-Bird, or **Sooty Tern** (*Sterna fuliginosa*), a species of the *Sternidæ* or Terns (q. v.), common in W. Indian seas, and coloured dull black above and white below. The bill is long and straight. The popular name of the bird is derived from the favour in which its eggs (numbering three, averaging 2 inches in length, and of a pale cream-colour) are held. Several other species of tern are also known under the name of E.-B.

Egg, Sea. See ECHINUS.

Eg'ham ('church-town'), a village in the county of Surrey, 18 miles W. from London, on the right bank of the Thames, and connected with the market-town of Staines, on the opposite bank, by a handsome bridge. The meadow of Runnymede, where King John signed Magna Charta, 15th June 1215, is in the neighbourhood. Pop. (1871) 5895.

Eginhard, or **Einhard**, a Frankish historian, was born about 770 in Austrasia, and studied at Aix-la-Chapelle under the famous Alcuin (q. v.). He became a favourite of Karl the Great, who made him his private secretary and superintendent of buildings. On Karl's death, Hludwig the Pious appointed E. tutor to his son Lothar. It was once supposed that in 815 he resigned his offices and entered a monastery, while his wife at the same time took the veil; but his title, Abbot of Fontenelle, of Blaidigny, &c., seems to have been merely a lay dignity, especially as his wife bore him a son after 815. Having received the relics of the martyrs Petrus and Marcelinus from Rome in 827, he placed them in his abode at Mühlheim, which he renamed Seligenstadt ('town of the blessed'), and where he founded a Benedictine abbey. He died probably in 844. The romantic tale of his loves with Emma, Karl's daughter, and of her carrying him across the palace courtyard, that the snow might not betray his nocturnal visit, is purely fictitious, as E. does not mention an Emma among the Emperor's daughters. A similar tale is recounted of a daughter of the Emperor Heinrich III. in William of Malmesbury. E.'s works include *Vita Caroli Magni*, a precious source of information in regard to the great emperor, rich in interesting details, and written in singularly excellent Latin; *Annales Regum Francorum, Pipini, Caroli Magni, et Ludovici Pii*; and *Epistolæ*, sixty-two in number, which shed considerable light on the history of his times. The best edition of E. is that by M. Teulet, with a French translation (Par. 2 vols. 1840).

Eglantine. See SWEET BRIER.

Eglinton, Earls of. See MONTGOMERY.

Eg'mont, Lamoral, Count, Prince of Gavre, one of the most striking historical figures of the 16th c., the descendant of an ancient and noble Batavian family, was born at the castle of Hamaide, Hainault, in 1522. In early youth he acted as page to the Emperor Karl V. In his nineteenth year he commanded a troop of light horse in an expedition to Barbary. In 1545 he married Sabina Countess-Palatine of Bavaria, the Emperor Karl, Ferdinand King of the Romans, and the Archduke Maximilian being present at the wedding. E. was the head of a splendid embassy to England in 1553, to solicit the hand of Queen Mary for Philip II. of Spain; in the spring of 1554 he was sent on a second mission to exchange the ratifications of the marriage treaty. To him were due the victories of St Quentin (1557) and Gravelines (1558), which the Spaniards won against the French forces. From his position and influence he became naturally involved in the struggles of the Protestants in the Netherlands. In this connection, the vacillation and weakness of his character proved his ruin. On the outbreak of the troubles he took his place side by side with his ally the Prince of Orange in the van of the malcontents; but when the Protestants arose in open insurrection, E. wavered, and finally deserted the Prince of Orange and the Protestants. The promulgation of the decrees of the Council of Trent in the Netherlands in 1564 occasioned the greatest discontent, and E. was selected to proceed (1565) on a mission to Madrid to lay before Philip the complaints of his Flemish subjects. Margaret, Duchess of Parma, whose administration as Regent of the Netherlands had been so far successful in establishing a spirit of toleration and conciliation between Catholics and Protestants, was superseded in 1567 by the cruel and bigoted Duke of Alva. The new governor called a meeting of the council of state at Culemborg House on the 9th September 1567, and here E. and his friend Count Hoorn, who had been invited to the meeting in the interests of the country, were arrested and sent under military escort to the fortress of Ghent. For the purpose of wreaking swift vengeance on those who had allied themselves with the cause of the people and of Protestantism, Alva instituted a tribunal which became popularly known as the *Council of Blood*. Arraigned before this court on a charge of treason, resting on ninety different counts, E. and Hoorn were

found guilty, were condemned to death, and were beheaded in the market-place of Brussels, 5th June 1568. See Juste's *Le Comte d'E. et Le Comte de Hornes* (Bruss. 1863); Prescott's *Philip II., King of Spain* (Routledge, Lond. 1862); Motley's *Rise of the Dutch Republic* (Vickers, Lond. 1856).

Egmont, Mount, a remarkable extinct volcano, of conical form and isolated position, in the province of Taranaki, in the N. Island of New Zealand, 8270 feet above the sea.

Eg'ret, a term frequently applied to a species of heron (*Ardea egretta*) inhabiting the southern parts of America, and passing northwards in the spring of each year. Its colour, and also that of allied species, is snowy white, the tail being of a yellowish tint. The bill is long and sharp, and of bright yellow colour. The average total length of the full-grown bird is 4 feet. The food consists of worms, fishes, and small mammals. The tail-feathers are in great request for the purpose of making brushes for switching away flies and other insects. The name E. is often very loosely employed in ornithology, and probably the separation of the egrets from the herons, advocated by some writers, is hardly warrantable.


Egret.

Egripo, or **Erripo**, an Italian corruption of the Gr. *Euripos*, 'the strait with the violent channel,' a name given first to the channel between Negropont and the mainland, and then to the town E., on the site of the ancient Chalcis (q. v.). Pop. (1870) 6447.

Egypt (Lat. *Ægyptus*, Ital. *Egitto*, Fr. *Égypte*), according to its present geographical limits, is the largest country in Africa, extending along the basin of the Nile from the Mediterranean to the equator, and including besides E. Proper, Nubia, Darfur, Kordofan, &c. It is bounded E. by Arabia Petræa, the Red Sea, Abyssinia, and the country of the Gallas; W. by the Libyan Desert, or eastern part of the Sahara; and S. of Waday by numerous native states and by the Albert N'yanza Lake. But the limits of its southern frontier are still very indefinite, nor can we feel quite sure of the permanence of the recent annexations. E. Proper is one of the most interesting countries in the world, on account of its early civilisation, its intimate connection with sacred history, its imperishable monuments of art, and the magnificence of its ruined cities and temples. The following table gives the areas and populations of the various divisions of the kingdom, according to the *Bevölkerung der Erde* of Behm and Wagner, Gotha, 1875:—

Divisions.	Area in sq. miles.	Population.
Egypt Proper (1872)	212,600	5,252,000
Nubia	333,800	1,000,000
Egyptian Sudan and annexations in the Basin of the Upper Nile	323,000	10,670,000
	869,400	16,922,000

E. Proper extends from the mouth of the Nile to the first cataract (Assouan), between lat. 24° 10' to 31° 35' N., and long. 25° to 35° E. The Arabian division of the country is still maintained, by which it is portioned into the three great districts, Masr-el-Bahri, or the Delta; El-Vustani, or Middle E.; and El-Said, or Upper E.—designations drawn from the broadly-marked changes observable in the course of the Nile. These three districts are subdivided into eleven administrative provinces. Cairo is the capital, and the other important towns are Alexandria, Damietta, Tanta, Rosetta, Bulak, Port-Said, Ismailia, and Suez.

General Aspect.—The great natural feature of E. is the river Nile, which flows through its entire length, and which is the means of its internal commerce; and the main support and regulator of its whole system of agriculture. In its windings through Nubia, and during its straighter course in E. Proper, the Nile (q. v.) is enclosed by a double range of low hills, sometimes 10 or 12 miles apart, but in many places approaching the river's banks precipitously. About 100 miles from the Mediterranean the stream separates into two main and several minor branches, enclosing the fertile region of the Delta. The western half of E. forms part of the Lybian Desert, and the hills which separate it from the Nile valley are called the Lybian Mountains. Those flanking the right bank of the river are the Arabian Mountains, which reach a height of 9000 feet. Between the Nile and the Red Sea the surface is for the most part hilly and barren, but there are numerous *wadis* or fertile ravines where a rich vegetation is kept alive by perennial springs. The cultivable parts of E. are the Delta, the Nile valley to the limits of the inundation, the oases in the Lybian Desert, and the fertile plains of Upper Nubia. There are also many productive tracts in the subject states and in the annexed territories, particularly in Darfur (q. v.), but these are only partially and rudely cultivated.

Hydrography and Climate.—The length of the Nile, from the Albert N'yanza to the sea, is about 3300 miles. It receives in its upper course the Asua, the Bahr-el-Ghazel, the Sobat, the Blue Nile, and the Atbara; but below the point of confluence with the last of these, and for the final 1500 miles of its course, its waters are not further augmented by a single tributary. The Atbara, or Bahr-el-Aswad ('black river'), is the great source of the black mud or slime that gives to E. her fertility. This alluvium is regularly distributed over the flat lands by the great annual inundation of the Nile, the most singular of all hydrographic phenomena, whether as regards its results or its regularity. The river begins to rise at Khartum, at the confluence of the Blue Nile, early in April, and in Lower E. the first day of the inundation is usually the 25th of June. The flood reaches its height in three months, remains stationary some twelve days, and then gradually subsides, leaving a deposit of mud which has been estimated as amounting to 6 inches in a century. Any irregularity of excess or deficiency in the inundation seriously affects the productiveness of the land, but this seldom happens. Much waste country is being reclaimed by improved irrigation and an extension of the system of canals. The climate is extremely dry, as the whole of E. Proper lies within the 'rainless zone.' The year is practically divided into the two seasons spring and summer, the summer heat being tempered by the fresh northerly or Etesian breeze. Of all the prevailing winds, the most oppressive and unhealthy is the Khamsin, or hot wind of the S., which blows during April and May. After the inundation, *i.e.*, in November or later, the soil gives forth exhalations which favour ophthalmia, dysentery, and other diseases. The temperature in Lower E. varies from 50° to 100° F., while it is some 10° higher in the southern parts of Upper E., where also the climate is healthier. The plague, which is rarely severe in its visitations, does not usually ascend far above Cairo.

Geology and Mineralogy.—The Lybian and Arabian hill ranges are cretaceous, consisting chiefly of durable sandstone, and being covered in part by nummulitic limestone. Of this limestone are built the three pyramids of Gizeh. A belt of granitic rocks, about 50 miles broad, stretches along the S. of Upper E., beginning at the cataract of Assouan, and extending into Nubia. It is a wild region, presenting bold cliffs towards the Nile, which is occasionally forced into splendid cataracts. Besides those already mentioned, the chief rocks are syenite, basalt, breccia, alabaster (at Tel-el-Amarna), and porphyry. To a great extent the surface is covered with the shifting desert sands. The alluvium brought down by the Nile consists partly of quartose sand, and partly of argillaceous earth. At Gebel Zabara there are emerald-mines. Among the other minerals are marble, salt, nitre, natron, and sulphur.

Botany, Agriculture, and Zoology.—The botany of E. Proper, which is confined within the Nile valley, is singularly rich, and includes many European trees and plants. The most notable trees are the date-palm, the doom-palm, the acacia, the tamarisk, and the sycamore. There is an extensive cultivation of sugar-cane, cotton, indigo, opium, hemp, tobacco, &c.; while among the fruits are the orange, apricot, pomegranate, lemon, and fig, besides apples, pears, peaches, plums, grapes, melons, and cucumbers. The lotus, or water-lily of the Nile, is still found, but the famous papyrus has retired far up the river. Agriculture has long been a favourite occupation, the system of irrigation having been carried to great perfection. The chief

cereals are wheat, barley, rice, millet, maize, and durra. In 1873 the area under cultivation amounted to 540,000 acres. The fauna of E. proper is extensive, including, besides all the usual domestic animals, the jackal, hyæna, ichneumon, jerboa, the camel, the crocodile, the soft tortoise (*trionyx*), the ostrich, &c. Among the animals formerly common were the hippopotamus, rhinoceros, and giraffe. There are many aquatic birds, and several kinds of serpents, of which the most deadly are the asp and the cerastes. The most notable insect is perhaps the sacred beetle (*Scarabæus sacer*). Of fish the Nile affords a plentiful supply, while locusts and mosquitoes are the scourge of the country.

Manufactures and Commerce.—The modern Egyptians are in great part an agricultural people, but the various manufacturing industries have been greatly developed of late years. Much attention has been devoted to the cultivation of sugar-cane in Upper E., and the banks of the Nile are fast becoming dotted with Government sugar-factories, of which there are already (1875) over twenty, producing 278,000,000 lbs. in a season. There are also large cotton-factories, several dyeing and cotton-printing establishments, extensive iron-foundries, and some ship-building. The other manufactures are pottery, firearms, woollen cloths, carpets, glass, and red caps. As in ancient times, E. has once more become the highroad of Eastern commerce, nearly all the trade to and from India passing now through the Suez Canal (q. v.). The vast traffic between E. and England is for the most part in goods in transit, chiefly from India. It consists of exports to England amounting (1874) to £10,514,798; imports from England, £3,585,106. There is, however, an important export trade in native produce, the principal articles of which are gum, ivory, hides, ostrich feathers, &c., from the Sudan; senna and wax from Abyssinia; tamarinds from Dar-fur; cotton and sugar from Upper E., besides mother-of-pearl, shells, drugs, &c. The chief imports are indigo, shawls, &c., from the East; sheep and tobacco from Turkey and Syria; cottons, woollens, and hardware from England and Germany; and cloth, furniture, and millinery from France and Austria.

Railways and Finance.—The railways of E. belong to the state, and have a total length (1875) of 955 miles. The two main lines are those from Alexandria to Suez, and from Cairo to Minieh, up the Nile valley. It is intended to carry the latter as far as Khartum. There are also 8690 miles of telegraph wires. The state expenditure in 1873-74 was estimated at £8,816,000, and the revenue at £9,911,300, while in the same year the aggregate state debt amounted to £70,044,740, of which £13,174,360 was the personal or private debt of the Khedive. Until recent years no financial accounts were published, but in 1874 appeared a condensed statement of the revenue and expenditure for the ten years ending September 30, 1873. At the request of the Khedive, a commission, presided over by the Hon. Stephen Cave, went from England to investigate the state of Egyptian finances and debt in December 1875. The modern coins are the piastre (of 40 paras) = 2½d., and the kees or purse (of 500 piastres) = £5, 2s. 6d.

Government and Army.—The ruler of E. pays to the Sultan an annual tribute of about £700,000. In 1866 the succession was made direct from father to son, instead of, according to the Turkish law, to the eldest heir, and in 1867 Ismail, the ruling prince, received in a firman from the Sultan the title of *Khedive* or sovereign. The administration is in the hands of a Council of State of four military and four civil dignitaries, appointed by the Khedive. The army, which is raised by conscription, consisted (1875) of four regiments of infantry, each of 3000 men, a battalion of chasseurs 1000 strong, 3500 cavalry, 1500 artillery, and two battalions of engineers, each of 1500. There are besides two regiments of black troops, numbering 2000. The navy comprises 7 ships of the line, 6 frigates, 9 corvettes, 7 brigs, 18 gunboats, and 27 transports.

Education and Religion.—Much is being done for the spread of education in E., the special superintendence of the schools being the duty of the second son of the Khedive. The theological university of Cairo was attended (1872) by 6774 students, while as many as 62,201 were receiving education at schools of all kinds. Promotion in the army has been made subject to educational tests since 1870. The great majority of the people are Mohammedans.

History.—Upper E. was once called Meroë, and at another time Cush or Ethiopia, both which names were afterwards carried to Abyssinia. The local name of E. itself is Chemi (Ham or Sham, also said to mean 'the black'); the Hebrew name was Mizraim, one of the tribes of the children of Ham. The Greek names, Ægyptus and the Land of Copts, were at first applied to the Delta alone. E. probably contained two races, that seen in the kings who ruled at Sais, and that seen in the kings and gods of Thebes. The first is marked by a retreating forehead, a forward mouth, and an excessive length from chin to the back of the head; it is still seen in the modern Fellah and the Galla tribe S. of Abyssinia. The second has an intellectual head, with upright forehead and aquiline nose. According to one view the latter was a conquering race, owning the land, to which it gave its warriors, religion, and language; the former tilled the land and paid the taxes (Morton's *Crania Ægyptiaca*). The first king of the old empire is Mena or Menes ('the eternal,' Minos and Menu?), the founder of Mennefer or Memphis ('good port') and of the earliest religious rites. His date varies from 3000 to 2000 B.C., the Greek lists of Eratosthenes, Manetho, and the tablets of Abydos being in almost constant contradiction. He is the first of six dynasties, some of which lived at This (Gr. Abydos), ruling over the land between Lycopolis and Tentyra. Another Thinite king, called Kakan, introduced the worship of the bulls Apis and Mnevis, and the goat Baentattu. In a later Memphite dynasty is the name of Ser or Serbes, afterwards made the god Aiemapt on account of the encouragement he gave to medicine and building with polished stones. The history of the fourth (Memphite) dynasty is contained not merely in Greek glosses, but in local inscriptions. Senefru conquered the 'Shepherds of the East' near the *mafka* mine in Sinai; Khufu (Cheops) built the great pyramid (*mer* or *abmer*) at Ghizeh, near which Caviglia and Mariette discovered the Temple of the Sphinx. Cheops also conquered Thebes (which had by this time absorbed This, Elephantine, Heracleopolis, and Heliopolis) and Tih, or the hill country in Sinai, where inscriptions may be seen at Wady Magarah. Besides the *primitive* deities, such as Ra, the Sun (who formed a trinity with Maut, the mother, and the hawk-headed Chonso, a moon-god), the *secondary* deities, Kneph, the ram-headed spirit, Pthah, the fire-god, Thoth, the ibis-headed god of letters or pillar-god, Athor or Venus, and Pasht, goddess of chastity, were now worshipped. Isis and Osiris were at first demigods, and their popularity changed from time to time. Their sons were Horus, the hawk-headed, and Anubis, the jackal-headed. Osiris had been killed by Typhon, the hippopotamus. Nephthys was the sister of Isis. This period is marked by the first *cavo rilievo* and painting in monochromes; it has an extensive hieroglyphic language. The fifth dynasty is called Elephantine, the name of a city on an island in the Nile, just below the cataract at Syene. The kingdom of Elephantine may have reached N. to Silsilis, and S. to the cataract at Abou-sambul in Nubia. The kings are now distinguished by the termination Ra. One of them, Ptahhetp, is the author of the moral precepts on the Prisse Papyrus. The sixth dynasty (Memphite) includes Nitocris, the 'rosy-cheeked queen,' and there is a trace of an expedition against the Herusha, or inhabitants of the Waste on the N.E. There were probably contemporary dynasties at This, Thebes, Memphis, and Elephantine. There was also a race of kings at Heracleopolis ruling from Memphis up the river to Lycopolis. A king of Heracleopolis (perhaps Amenemha III.) constructed the Lake Mœris to drain off excessive inundation and to store against deficient inundations. Another king of Heracleopolis built the Labyrinth with 1500 cells—the Tomb of the Sacred Crocodiles described by Herodotus. In the city of Chois, in the Delta, there was an independent dynasty of priests, who saw the invasion of the Hykshos, or shepherd kings, called 'lepers' in the British Museum Papyrus, probably an Arabian or Phœnician race, who fixed themselves at Memphis and confined the native rulers to Thebes. But these names lead into what Dr Birch—occupying a middle place between the extravagant chronology of Bunsen and the sober estimates of Sharpe—calls the Middle Empire, consisting of twelve dynasties from B.C. 2000 to B.C. 1600. This period ends just before the reign of Rameses I., whose date in Sharpe's chronology is *circa* B.C. 1200. A more interesting era is that of Thothmosis III., *circa* B.C. 1322, when it seems almost certain that the sovereign power of E. was concentrated at Thebes (Tape, or '*the* city'). Before going to that era, a few names must be mentioned. Osirtesen I., King of Thebes, perhaps before the conquest by

Cheops of Memphis, built the tombs of Beni Hassan; adapted hieroglyphics to represent not objects or even words merely, but syllables and letters; divided the year into the seasons of vegetation, harvest, and inundation, containing twelve months of thirty days, to which the five additional days, called by the Greeks *epagomenai*, were added; and encouraged the application of steel to the arts of peace and war. Thebes and Memphis combined against the Hykshos, or Caphtorites, whom they drove into the N.E., and who left behind in the name Pelusium their Canaanitish name of Philistines. Amunothph I. (1430?) first married a black-skinned wife, thus obtaining Ethiopia as far as Tombos or Napata. Negroes now appear in the sculptures as domestic and agricultural servants. It was in the 14th c. B.C. that Zeph-net-Phœnich, the biblical Joseph, introduced the ryot tenure to Lower E., the land-tenants paying a fixed rent of one-fifth. It is not clear whether the biblical Pharaoh was king of Memphis or of Bubastis. The Hebrew immigrants, called *Shemmo*, or 'strangers,' were placed in Goshen ('upper lands') and the town of Succoth ('the tents'). Memphis and Thebes are again brought together by the marriage of Thothmosis II. to Nitocris, but a striking difference is still to be observed between the architectures of Upper and Lower E., between excavated tomb and pyramid, between the work of free men and that of slaves. The Egyptians knew at this time the wedge, the lever, the inclined plane, but not the screw, the pulley, or the wheel and axle. They had, however, two-wheeled carriages in place of the primitive boards strapped on the backs of two asses. From B.C. 1322 to 990 we have the Theban kings supreme in E. The horizon of history widens in the reign of Thothmosis III., whose warlike and commercial expeditions to Nubia and Syria are chronicled on the sandstone wall at Karnak. King Amunothph II. is probably the Pharaoh under whom Moses led out the Israelites, who, identified with the old Phœnician invaders, had latterly been treated with severity. Thothmosis IV. (builder of the Great Sphinx) was succeeded by Amunothph III. (lord of Mendes, and called by the Greek epitomists Memnon), whose name is found very often in the granite district of the Second Cataract. He built the musical Colossus at Luxor, and married Tii, a foreign woman painted pink. He cultivated the cat-headed goddess Pasht, and tried to introduce from Ethiopia the worship of Atennefru, 'the most lovely disc' of the sun. The next king persecuted all religion except the solar, and drove out the Greek settlement at Sais, which had flourished there for centuries, and whose movement gave rise to the legends of Erechtheus, Cadmus, and Danaus in Greece. Rameses I. (first king of the nineteenth dynasty) is succeeded by Seti or Oimenephthah I., whose alabaster sarcophagus, discovered by Belzoni, and now in the Sloane Museum, is the most beautiful of Egyptian monuments. Rameses II. warred against the Khita (Gr. Bactrians), supposed by Gladstone to be the Ketæi of the Odyssey. See the Sallier Papyrus (British Museum), called the 'Iliad of Egypt.' Besides the Memnonium and the Hall of Columns, he built the well at Contra Pselcis for the gold-miners who crossed the desert with their asses to Gebel-Ollaki. He sent his negro prisoners to the N., and his Asiatic prisoners to the S. The names on the monuments of Oimenephtah II. suggest among his enemies the Sharutana or Sardinians, the Turska or Etruscans, the Shakalusha or Sicilians, the Luka or Lycians, and the Akaiwsha or Greeks (formerly called Hanebu or Ionians). This king is supposed by some to be the Pharaoh of the Exodus. A new route has been suggested for the Israelites, viz., by the isthmus between the Mediterranean and the Lake Serbonis, full of seaweed and reeds. See Brugsch Bey's lecture before the International Congress of Orientalists, 17th September 1874 (*Academy*, 26th September 1875). After a period in which the Harris Papyrus indicates the presence of a Syrian usurper, Rameses III., the Solomon of E., called by Herodotus Rampsindus, with the help of his Council of Thirty, reorganised the social classes. His lists of victories refer to the Pulusata (Pelasgi), Tsekkarin (Teucrians), Uashasha (Osci). Rameses XII. is connected with the worship of Khons (the Moon), whose temple contained the *Cynocephali*, or living apes. The College of Sacred Tribes (*rekhkhet*), and the doctors of magic (*rekhget-amon*, 'those acquainted with hidden words,' the *chartummins* of Exodus), sent the ark of Khons to cure a princess in Bakhtan (thought to be Ecbatana). By this time additional gods had appeared—in Nubia, Chem, the god of generation, who carries a whip; Sebek or Seb, the crocodile: in the Delta the sun was called, not Amun-Ra, but Athom and Mando; Neith was the queen of heaven, who gave kings and sages inspiration through the sacred acacia-tree. The period (B.C. 945–697) is marked by the rise of Tanis and Bubastis and the E. of the Delta, the decay of Thebes, civil wars, and the Ethiopian invasion. At Thebes the Ramessid dynasty is succeeded by the high-priests of Amun, who were conquered by Shishank (Gr. *Sensonchoses*) of Bubastis, an ally of the Jews. Amid many striking differences of custom (*e.g.*, the Egyptians worshipped animals, the priests shaved the head, the people marked their bodies, food was placed in tombs, trees were planted in temple-yards), both Egyptians and Jews practised circumcision, abhorred swine-flesh, and reckoned sunset as the beginning of the day, and much religious ceremony is common to the two nations. Shishank gave the military class freedom from taxation. For two centuries there seems now to have been great confusion. Tanis, the seat of the export trade in corn, linen, and drugs from E., rose into importance, to be succeeded by Sais, on the Canopic branch of the Nile, where Bocchoris the Wise enacted the laws that no debtor should be put in prison, and that there should be a written acknowledgment of every debt. Sais itself as well as Thebes and Memphis succumbed to the Ethiopian king Piankhi. There is some confusion between this expedition and that of Sabaco or So, whom Manetho makes the first of the twenty-fifth or Ethiopian dynasty. The Assyrian cuneiforms now throw light on Egyptian history, and Tirhakah, the third Ethiopian king, is the contemporary of Hezekiah, and the opponent of Sennacherib and Esarhaddon. The latter organised a portion of E. into a subject state governed by twenty small kings. Tirhakah or Rutamen renewed the contest with Assur-bani-pal, and after this we find a line of native kings (distinguished by basalt monuments) consolidating power at Sais in the W. Delta (B.C. 697–523). Among them Psammetichus I. is prominent. Necho developed the Egyptian navy, and after his conquest of Syria had been nullified by Nebuchadnezzar of Babylon, he constructed the great trench from the Bitter Lakes to the marshes at Pelusium, and by one account anticipated the Periplus of Hanno by sending his ships round the Cape. Another Psammetichus (B.C. 588) was the friend of Zedekiah, and probably in his reign Jeremiah wrote his Lamentations at Hieropolis. Hophra (Gr. Apries) and Aahmes continued to encourage Greek influences in both trade and the army. Amasis, who owed his elevation to a revolt of the old army (the Calasiries and Hermotybies, all tenants of six acres of crown-lands, serving compulsorily for three years) against the mercenaries, made Naucratis the chief port of E. Amasis also established the power of E. in Cyprus. After his death Cambyses reduced the whole country, and from B.C. 523–332 the Persian rule is broken by successive rebellions. By the laws of the Sais supremacy, death was inflicted for murder and perjury and even for killing a slave; killing a child was punished by three days' imprisonment with the dead body. Wherever possible, the punishment fell on the guilty limb. The accumulation of interest was limited to double the sum originally lent. Parricide was punished by burning. There was no limit to the number of wives permitted by law; only the priests were monogamists. The priests were in four classes—the Soteno, wearing the tall ball-topped linen cap; the Nowto, wearing the flat ring or plate of gold; the Othphto ('dedicated,' Gr. *katochoi*), under monastic vows of seclusion; the Bachano, or hired servants of the rest. The number of local names given to products shows the vigour of industry, viz., ammonia, from the oasis of Ammon; syenite, from Syene; natron and nitre, from Mount Nitria; alabaster, from Alabastron; topaz and sapphire, from the islands of Topazion and Sapirene in the Red Sea; emerald, from Mount Smaragdus, &c. In sculpture, critics already distinguish the Ethiopic, Assyrian, Greek, and later Egyptian or Saitic schools. The first is marked by unnatural stoutness, the second by clumsy action, the third by tasteless shows of anatomical knowledge, the fourth by grace and strength, without the awful majesty of the early monuments. No clay models were used, and respect for the dead prohibited an intimate knowledge of the human muscles. E. under Darius formed part of the African satrapy, paying as tribute 700 silver talents, the revenues of Lake Mœris, and 120,000 measures of corn. After three native *meleks* or satraps, Mandophth took advantage of the Persian disasters in Greece to assert his country's independence (B.C. 487), but the tyranny of Xerxes or Kshairsha (who absorbed the army of E. into his own) succeeded, and after the more successful revolt of

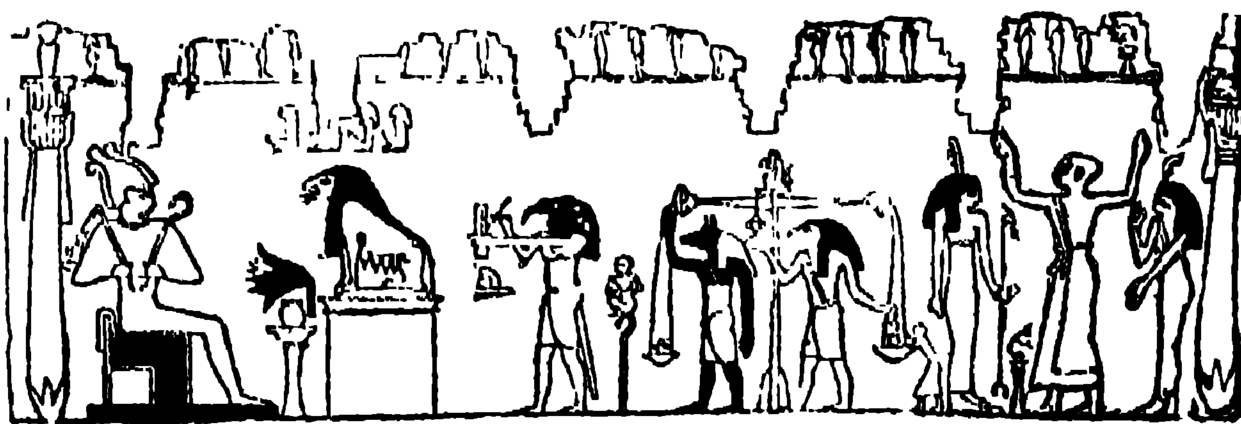
Marus, who hired Athenian troops, and Amyrtæus in Lower and Upper E., Artaxerxes Longimanus reconquered E. in 440 B.C. About 400 B.C. Nepherites of Mendes (first of thirtieth or Sebennyte dynasty), allying himself with Sparta under Agesilaos, again broke the Persian rule, which, in spite of the attacks of Artaxerxes Mnemon, was not re-established till 349 B.C., when Artaxerxes Ochus destroyed the kingdom of the Copts. At this time Anaxagoras visited E., and Herodotus; and later came Eudoxus the astronomer, who formed the *octaëterid* (period of eight years or ninety-nine months); Chrysippus the physician, and Plato. In 332 B.C. Alexander the Great entered E., meeting with little resistance. He respected the native religion, and divided the country into two monarchies or judgeships, both of which were filled by Egyptians. The reign of Ptolemy Soter extends from B.C. 322–284, the early part of it under the nominal sovereignty of Philip Arrioæus and Alexander Ægus. The defeat of Perdiccas was followed by the conquest of Jerusalem, Phœnicia, Coele-Syria, and Cyprus, and by the defeat of Antigonus. Ptolemy's rule was beneficent, but he kept the two races asunder by declaring that the children of mixed marriages were barbarian. In return for the knowledge which the Greeks brought to the Museum or College of Philosophy at Alexandria, they got the use of papyrus, a great multiplier of books, for which only linen, wax, bark, or tree leaves had been used before. Ptolemy introduced a proper coinage in gold, silver, and bronze to E. His drachma weighed about 55 grs., so that the silver talent was about £150 in value. The chief coins were the gold tetra-stater (8 drachmas) and the silver tetradrachma. Under Ptolemy Philadelphus (B.C. 284–246), the son of Soter and Berenice, a connection springs up between Rome and E. Philadelphus built the Pharos lighthouse and the troglodytic Berenice on the Red Sea, which was joined to Coptos by a road that passed Smaragdus (rich not only in emeralds but in porphyry and *breccia verde*), and was furnished with four great inns or watering-houses. Arsinoë (near the modern Suez) and the Temple of Isis on the island of Philæ (properly Abou-lakh, 'city of the frontier') were also built. The population of E. was estimated at 7,000,000, the army at 220,000, maintained on a revenue of 14,800 talents (£2,250,000) and 1,500,000 artabas of corn (5,000,000 bushels). The Museum Library contained 200,000 Greek papyri. Its directors were the accomplished Demetrius Phalereus and Zenodotus, one of the earliest editors of Homer. There, too, was Ctesibius, the inventor of the water-clock; Theocritus, the Sicilian idyllist; Callimachus, writer of elegiacs and professor of poetry at the Museum; Strato, the physicist, a pupil of Theophrastus; Timocharis, the astronomer, who by observation of the fixed stars prepared the discovery of Hipparchus that the equinoctial point had moved; Aristarchus, who anticipated the Copernican theory. The king caused Manetho, a priest of Heliopolis, to write his list of kings from the hieroglyphs. The empire of E. included parts of Pamphylia, Cilicia, Lycia, and Caria. The reigns of Ptolemy Euergetes, Philopator, and Epiphanes occupy the period B.C. 246–180. Some of the exploits of the 'Benefactor' in Syria and Ethiopia are chronicled in the famous bilingual inscription at Canopus. The Museum flourished. Aristophanes, the grammarian, the inventor of the long and short marks, the aspirate, and the accent, put new life in the public readings, and Eratosthenes, 'the surveyor of the world,' by his theory of shadows laid the foundation of astronomical geography. He also wrote a history of E. in correction of Manetho. Apollonius of Perga first taught conic sections, and Archimedes, the friend of Conon, invented his *cochlea*, or screw pump, so useful in Egyptian irrigation. By the battle of Raphia, Philopator recovered the Syrian provinces which Antiochus the Great had seized, but during the minority of Epiphanes (the Illustrious), notwithstanding the tutorship undertaken by Rome, they were again lost to E. The love of letters still lived in the Ptolemies, but along with it a fatal moral corruption. Ptolemy Philometor Eupator and Euergetes II. fill up the space from B.C. 180–116. Roman intervention saved the whole empire from being seized by Antiochus Epiphanes, and assisted at the divisions between the two brothers. Philometor, who gave some of the highest state offices to Jews, offended his own Coptic subjects by putting Greek inscriptions on the new temples. A change is noticeable in the architecture of the time. The screen in front of the great portico is almost removed by having a doorway made in it between every pair of columns. Corporations of monks begin to appear, and from the contemporary documents we find that sales of slaves and gifts to the Church for the benefit of the dead were common. Euergetes, who recognised the independence of the Maccabees, and warred in Syria against his sister Cleopatra, was a monster of cruelty and sensuality. As regards literature, the honour done to critics (such as Aristarchus) is symbolised in the sculpture called the 'Apotheosis of Homer.' The leading figure of the time is, however, Hipparchus, who, with an instrument having a plane parallel to the equator and a gnomon parallel to the earth's pole, observed the equinox and its precession, which he said was along the ecliptic, and not the equator. With him we may put Hero, the ingenious mechanic, whose pneumatic toys are still admired. Agatharcides has left an intelligent account of his survey of the Red Sea, and some attempts were made at a passage to India. Dioscorides was reached. From B.C. 116–51 we have the reigns of Cleopatra Cocce with Ptolemy Soter II., and then, with Ptolemy Alexander I., Cleopatra Berenice, Ptolemy Alexander II., and Ptolemy Neus Dionysus. The period is one of intrigue, civil violence, and vice in high places. The Alexandrian Jews begin to count for something in the political world. Lucullus, the Roman ambassador, finds the Old and the New Academy in debate at Alexandria. Diodorus Siculus is astonished by the fervour with which, outside Alexandria, snakes, crocodiles, cats, ibises, and bulls are still worshipped. The Egyptians still believed in a creation by Ra, the Sun, acting on the river Nile, and in a bodily resurrection, which explains the importance of embalmment. They still buried with the mummy *The Book of the Dead*, explaining the method of judgment passed upon souls. King, priest, and soldier were still the only landholders, and the thirty judges of the three great cities still administered the eight books of the law. Caricature begins to appear on the monuments. According to Strabo bad government had reduced the revenue to 12,500 talents, and the population to 3,000,000. Cyrene and Cyprus successively fall into the hands of Rome, and along with commerce literature also declined. The reign of Cleopatra and her brothers, with the episodes of Julius Cæsar and Mark Antony, occupies the period B.C. 51–30. The Museum was burned, but the equally large library of Pergamos was placed in the Temple of Serapis. During the three centuries of the rule of the *Lagidæ*, changes had occurred in the religion. Pthah and Serapis had become the chief gods; and the moon, which had formerly appeared on the heads of gods, now takes a separate individuality under the name of Soh. The new hieroglyphic characters were the camelopard, mummy on a couch, ship with sails, and chariot with horses; more words are spelled with letters; and with the papyrus the enchorial or demotic writing with few symbols was gradually displacing the hieratic. From this time to A.D. 640, E. is a Greek province of the Roman Empire. The equestrian prefect was not amenable to the senate. A vigorous judicial system was set on foot. The chief native magistrates were the keeper of the records, the police judge, the prefect of the night, and the *exegetes* or interpreter. Even these officers, however, were not Roman citizens; they were merely imperial freedmen. No municipal government was allowed. The Julian civil year of 365¼ days, beginning on 29th August, was introduced, so that E. had three calendars—the Julian; the popular year, beginning on 18th July, the day of the heliacal rising of the Dog-star; and the astronomical year of 365 days with a movable first day. Augustus was anxious to prevent oppression by the tax-gatherers, and by his orders the canals were cleared, and the Nilometer at Elephantine built, which shows a maximum rise of twenty-five royal cubits and four handbreadths. Strabo (who travelled to E. under the prefecture of Gallus) describes the wealth and business of Alexandria. The Roman Empire did not extend beyond the *dodecaschœnos* (70 miles) beyond Syene, and this frontier was often troubled by the Ethiopian Arabs of Queen Candace. The worship of Isis and Serapis penetrated to the court of Rome, and Virgil distinctly teaches the Egyptian millennium. Afterwards there was a law against the Egyptian and Jewish superstitions. The pretensions of Caligula to divine honours formed the pretext of an attack by the Greeks on the Alexandrian Jews, whom they wished to deprive of civil rights; the embassy of Philo proved less powerful than that of Apion the grammarian, and not till the time of Claudius did the Jews regain their privileges. Claudius also stopped the oppressive practice of Roman citizens travelling through E. free of expense; he restored an independent coinage. The trade with India in

silk, precious stones, ginger, spices, and that with Africa in ivory, rhinoceros teeth, hippopotamus skin, tortoiseshell, apes, and slaves, converging on the Coptos-Berenice route, grew rapidly. The linen trade of Upper and the cotton trade of Lower E. were large, and Alexandria was the largest granary in the world. The excellence of Egyptian chemistry is shown in the Arabic name *al-chemi*, the Egyptian art. Their colours were prepared by the use of a mordant liquid, and their ink (used chiefly on the mummy cloths) was made of nitrate of silver. Naphtha, or rock-oil, bears an Egyptian name. The trade in papyrus in all its varieties, from Hieratic and Fannian down to emporetic (used for wrapping parcels), increased its area. In the reign of Nero (A.D. 55 68) Christianity makes many converts in Alexandria—Jews, Egyptians, and Greeks. Wild Arab tribes from Lower Ethiopia, especially the 'headless' Blemmyes, infested the frontier. The prefect's decree issued on the accession of Galba illustrates the revenue-tyranny which it was intended to stop. Vespasian, whom the Alexandrian Greeks called Cybiosactes ('the scullion'), owed his reception in Alexandria very much to Dion Chrysostom, the rhetor, and Apollonius of Tyana, the impostor; for the philosophers now constituted an important class. In Domitian's time we have from Juvenal a satirical account of E. He testifies to the military oppression, and says the people left nothing unworshipped except the goddess of chastity. Plutarch's narrative of the same age describes the habits of the priests in shaving the whole body, wearing only linen, and refusing some meats as impure. The intellectual creed was then becoming Manicheeism, and less regard was paid to external observances. Serapis was the supreme ruler, and the other members of the triangular trinity, Isis and Horus, were invested with more pleasing human attributes. Trajan (98-108 A.D.) rebuilt the Bitter Lakes Canal on a new route from Memphis. In consequence of civil war between the Cyrene Jews and Alexandria he also deprived the former of citizenship. The philosophical reputation of the capital was sustained by Justin Martyr and Athenagoras, both converts. The beginning of the reign of Antoninus Pius (A.D. 138) is remarkable as the end of the Gothic period of 1460 years, which was called the 'Return of the Phœnix.' This happened when Claudius Ptolemy, the author of the *Syntaxis* or *Almagest*, containing the record of eclipses for eight centuries, and the name-father of the old solar system of cycles and epicycles, was the leading savant of Alexandria. The *Itinerary* of Antoninus gives a description of the six great roads in E., and this is supplemented by the *Periplus* of Arrian, who notes the appearance of glass and sugar in the Red Sea trade. The reign of Aurelius (A.D. 162-181) is without political events except the rebellion of Cassius, but the Library was then in its glory, and was attended by many grammarians, with Athenæus the Deipnosophist at their head. They give employment to the two trades of 'quick writers' and 'book writers.' Lucian, then secretary to the prefect, darts his humour at the immovable superstitions of the country. At this time the orthodoxy of the old religion seems to have centred at Canopus (a town which gave its name to the jars for holding the soft parts taken from the mummy). There, in the sacred processions, the singer repeated the *Book of Hymns* and the rules for the king's life; the soothsayer, with his hour-glass and palm-branch, repeated the books on the moon's phases and the fixed stars and their risings; the scribe, with his flat rule, knew the geography of the world and the books concerning the planets and the furniture of the temple; the robe-master, with the sacrificial vase and rod of justice, knew the books concerning the sacred heifers, education, first-fruits, and the order of worship and of festivals; the prophet or ventriloquist, with the great water-pot or speaking-bottle, knew the hieratic books concerning the laws, the gods, the temples, the revenue. These were thirty-six of the Books of Thoth; the other six, on diseases and medicines, were learned by the Pastophoroi, who carried an image of the god in a small shrine. At Alexandria, on the other hand, the Eleusinian mystery (of a serpent carried in a basket) was well known; and it is thought the priesthood had generally an *esoteric* faith which, by such names as the 'Secret of Abydos,' they endeavoured to conceal. In spite of persecution the catechetical school of Clemens was continued by Origen, and shortly after Caracalla built a temple to Isis at Rome, and Egyptians entered the Roman senate. The great names of Saccas, Plotinus, Longinus, and Porphyry, which adorned Alexandria during the beginning of the 3d Christian c., are elsewhere described; and the numerous changes and struggles of Christian doctrine of which E. was the scene belong to the history of the Church. In the feeble reign of Gallus (A.D. 251) famine induced a plague, ulcer of the tonsils, which greatly reduced the population. For a short time (A.D. 260) E. was independent of Rome under the soldier Alexander Æmilianus. In A.D. 270 Zenobia of Palmyra made an attempt to gain E., which, after a few months' success, was defeated by Aurelian, but both Saracens and Palmyrans continued to assail the province, and Firmus, a wealthy paper-merchant, with the help of Arabs and the Coptic population, made himself independent for a time in Upper E. Frequent rebellions of lesser size were followed by the great one of Achilleus against Diocletian, who had just resigned Nubia to the native tribes. With the rise of Byzantium the Greek element begins to yield to the native Egyptian; theology displaces philosophy; Iamblichus seems insignificant by the side of Arius and Athanasius. Indeed, after the division of the Empire the Patriarch or Bishop of Alexandria seemed at times almost independent of Constantinople. The paralysis of political power is shown in the system of patronage by which towns without charters paid a government official for his unauthorised protection. When Jovian restored Christianity (A.D. 363), the monastic system was already in full vigour among the Cœnobites, the Anchorites, and the Remoboth. About A.D. 379 the Saracens approach the N.E. frontier, and being many of them Christians, side with the Egyptian Homo-ousians against the Arian Greeks. The radical policy of Theodosius did not entirely destroy the Pagan worship, still practised in secret at Canopus, but it did destroy the great Serapis Library of 700,000 volumes. The lamp of philosophy was still held up by Proclus and his followers. The government divided E. into Upper Libya or Cyrene, Lower Libya or the Oasis, the Thebaid, Ægyptiaca or W. Delta, Augustanica or E. Delta, and Heptanomis or Arcadia. The tax-gatherers were called 'counts of the sacred largesses,' and had a great crowd of *numerarii* (clerks). About A.D. 450 a Nubian invasion almost extinguished Christianity in Upper E. On the other hand a series of ecclesiastical quarrels, in which the national mind was interested, was settled by the edict called 'Henoticon,' issued by the Emperor Zeno in A.D. 477, which passes by the decrees of Chalcedon, calls Mary the 'Mother of God,' and admits that the decrees of Nicæa and Constantinople contain everything necessary. In the reign of Anastasius (A.D. 501) the Persians under Kobades overran Syria, and laid waste the greater part of the Delta up to the very walls of Alexandria. Under Justinian a singular strife went on between the Coptic patriarchs, who were Jacobites, and the Melchite or Royalist patriarchs, who were armed with the authority of civil prefects. This lasted till the Persians took Antioch, and the defence of the Egyptian frontier was practically left to the monasteries on the Elanitic Gulf. A change in the government was made by the thirteenth edict of Justinian, from which it appears that the Augustalian Cohort of 600 men was charged not only with the defence of the province, but with supervising the collection of the 800,000 artabæ (4,000,000 bushels) of corn. In the reign of Heraclius (A.D. 618) the Persian Chosroes became master of the whole of E. for ten years. He even built a palace in Alexandria. Heraclius drove out the Persians, but for several years he paid a tribute to the Calif Omar, and in A.D. 638-640, Amrow, the son of Ase, partly through the treachery of some native Egyptians, overcame the brave resistance of the Greek garrisons. The terms of the Moslem conqueror were :—'Pay tribute, embrace the Koran, or die.' At first E. paid two gold pieces for every male of military age. By Omar's famous order the Library was used for heating the baths. The history of E. now becomes part of the history of Arabia and the Arabs. It was governed from a new city, Musr or Cairo, between Memphis and Heliopolis, and these cities were pulled down to build mosques and other public buildings. In A.D. 868, the local governor of the Abbaside califs usurped the sovereignty, and founded the Tooloonide dynasty, which lasted till A.D. 906. The power of the califs was again interrupted by Mahdee, the governor of E. Africa (A.D. 912-934), and Mohammed, a Turkish officer in the Arabian service (A.D. 936-970). The descendants of the former founded the Fatimite line of califs, who till A.D. 1171 ruled at Cairo independently of Bagdad, taking a large share in the wars of the Crusades. The Eyubite dynasty was succeeded by a race of Baharite sultans, or Meleks, consisting of Turkoman Mam-

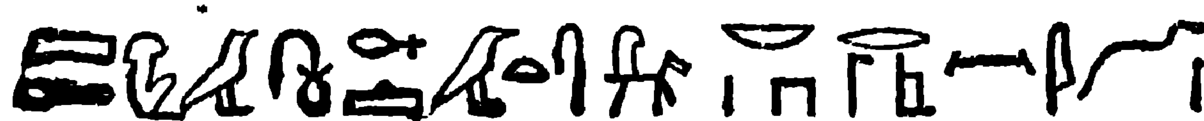
lukes, who joined Syria to E., and held the Abbasides in subjection. The Circassian Mamlukes (A.D. 1382–1517) were crushed by Sultan Selim I. at Heliopolis. The conqueror organised an independent government of E. by a Pasha and twenty-four Beys, headed by the Sheik of Belad. The army and power of taxation, subject to certain conditions, were left with the Mamluke aristocracy. Under this arrangement there was frequent revolt. When Napoleon went in 1798 to free E., Britain intervened on behalf of the sovereign rights of the Sultan, but its success was neutralised by the *coup-d'état* in 1811 of Mehemet Ali, who murdered nearly all the Mamluke Beys (some escaping into Dongola) and reigned till 1848, the Hatti Sheriff of 1841, guaranteed by the Great Powers, confirming the succession to his heirs. Ali's government was a contrast to the savage oppression of the Beys. He established regular courts of justice, and introduced European manufactures and machinery. But there was only the form of representative government, and the wars in which the Vali (or Viceroy) and his son Ibrahim took part made necessary an enormous taxation and a heavy conscription. The leading class under this military regime was the Osmanlis. Ali took part in the Greek war of independence, and after the conquest of Syria in 1835 might have got rid of his nominal superior, the Sultan Mahmoud II. But in 1840 the Quadruple Alliance intervened in favour of Abdul Medjid. The successors of Ali—Abbas, Said, and Ismail I.—have done little for their country. The last named assumed the title of Khidiv-el-Misr (King of E.) in 1866, and by increasing the amount of his annual tribute to the Sultan, secured, in 1873, the right of negotiating independent treaties. In the same year he annexed by a short war a considerable territory in Darfur, and in 1876 extended his authority southwards almost to the Equator. By a series of bad bargains with the French *concessionaires* the Khedive has embarrassed his revenue to an almost incredible extent. At present (1879) his affairs are practically under trust. See Dr. Heinrich Brugsch-Bey's *Geschichte Ægyptens* (Leips. 1877), the latest and by far the most valuable history of E. yet written. A most admirable and complete work on the E. of the Khedive is M'Coan's *Egypt as it is* (Lond. 1877), the information in every case being obtained from the highest European functionaries.



Painting in Tomb near Thebes.


Trial of the Dead.


Hieroglyphic.


Hieratic Writing.

Egyp'tian or **Al'pine Vul'ture** (*Neophron percnopterus*), a species of *Vulturinæ*, distinguished (as are other members of the genus *Neophron*) by the long bill with the nostrils situated at its middle, by the third quill being the longest of the wings, by the wedge-shaped tail, and by the front of the head, throat, and cheeks being destitute of feathers. This bird, sometimes named 'Pharaoh's chicken,' is coloured of a general white, the quills of the wings being dark brown. The sexes are coloured alike, the plumage of the young being brown. This bird is carefully protected from injury in Egypt by laws, and subsists on carrion of all kinds. The nest is made upon a rock, and the eggs are three or four in number, and of grey colour. It inhabits S. Europe, N. Africa, and Asia.

Ehr'enberg, Christian Gottfried, an eminent German naturalist, was born at Delitsch, in Prussian Saxony, April 19, 1795, and studied at the universities of Leipsic and Berlin. He graduated in medicine in 1818. His devotion to botany soon gained him a high reputation, and caused him to be sent along with Hemprich in an expedition despatched to the East in 1820 by the Academy of Sciences. In spite of fatigues to which Hemprich succumbed, E. travelled through Syria, Egypt, Abyssinia, and other parts of Africa, and returned to Berlin in 1826 with a great collection of hitherto unknown plants and animals. The results of his labours were seen in several valuable works, including the well-known *Akalephen des Rothen Meeres* (1836). E. set out with Humboldt in 1829 on his Ural and Altai expedition, and here he laid the foundation of his great work, *Organisation, Systematik, und Geographisches Verhaltniss der Infusionsthierchen* (completed in 1838 at Leipsic). Some of E.'s conclusions regarding Infusoria are now disputed, but he was the first to study their organisms scientifically. In 1847 he was appointed Ordinary Professor of Medicine. Among the subsequent works of E. are his *Mikrogeologie* (1854), and *Ueber den Grünsand* (Berl. 1855). He died at Berlin, 27th June 1876. See Hanstein's *C. G. Ehrenberg* (Bonn, 1877).

Ehrenbreit'stein ('Broad stone of honour'), a town and fortress of Prussia, on the right bank of the Rhine, connected with Coblenz, on the opposite bank, by a bridge of boats and a beautiful railway bridge. The town has two Roman Catholic churches, a synagogue, and a mineral spring, celebrated as early as the 14th c. Pop. (1871) 2488, exclusive of the garrison (2169). There is a trade in wine, corn, tobacco, &c. The fortress, the 'Gibraltar of the Rhine,' is accessible only on the N.W. side, which is protected by a triple line of formidable defences mounted with 400 guns. On the top of the rock is a platform used as a parade ground, under which are arched cisterns capable of holding a water-supply for the garrison for three years. E. was originally a Roman fort. The French reduced it in 1799 by famine, and dismantled and blew it up at the peace of Luneville in 1801. Prussia was put in possession of it by the Congress of Vienna in 1814, and it is now one of the most formidable fortresses in the world.

Eib'enstock ('Place of yews'), a town in Saxony, 16 miles S.S.E. of Zwickau, with manufactures of tin, tobacco, chemicals, lace, and muslin. Pop. (1871) 6205.

Eich'horn, Johann Gottfried, the most eminent of the Rationalistic theologians of Germany in his time, was born at Dörenzimmern, in the principality of Hohenlohe-Oehringen, 16th October 1775. He studied at Göttingen, and was Professor of Oriental Languages at Jena (1775–88), and at Göttingen from 1788 till his death, June 25, 1827. He was the first among professional theologians to deal with Scripture freely on the footing of a mere literary work; the principle on which he studied the Bible being expressed in his apostrophe to the writers:—'However great my respect for you, ye holy men, never let me fall into the superstitious idolatry already deprecated by yourselves, or deem it irreverent to submit your productions to the strictest rules of human criticism.' His *Einleitung in das Alte Testament* (3 vols. Leips. 1780–83), which was the first work entirely devoted to the subject, and which was received with extraordinary favour, produced a great effect both on the manner of treating the subject generally, and on the prevalent views in regard to the particular subjects on which he touched. Of his *Einleitung in das Neue Testament* (2 vols. Gött. 1804–10), the most prominent part was his theory of an 'urevangelium,' or original gospel, in which the same process of grouping and comparison which had been applied

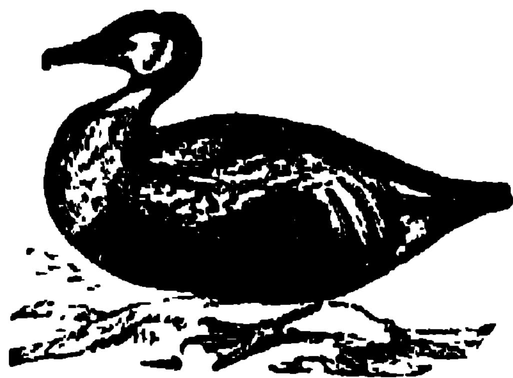
to the various readings in order to purify the text is used in regard to the variations of the narratives for the purpose of arriving at the true original gospel. Besides the above, his works in the same class are *Comment. in Apoc. Joh.* (2 vols. Gött. 1791); *Urgeschichte* (2 vols. Nürnb. 1790–93); *Einleit. in die Apocryph. Schriften des Alt. Test.* (Gött. 1795); *Allgem. Bibliothek der Bibl. Lit.* (10 vols. Leips. 1787–1801); *Die Hebr. Proph.* (3 vols. Gött. 1816–20); *Repertorium für Bibl. und Morgenl. Lit.* (18 vols. Leips. 1777–86). E. also wrote voluminously in political as well as literary history. His last important work was *Urgeschichte des erlauchten Hauses der Welfen* (1817).

Eich'stadt, formerly **Aichstädt** (*i.e.* 'oak-town'), a town of Bavaria, 30½ miles S. of Nürnberg, in a deep valley on the Altmühl. It is a bishop's see, is well built, and has an ancient appearance. The principal buildings are the palace of the ducal family of Leuchtenberg, with its beautiful park, the cathedral, founded in 1259, with the grave of St Wilibald, the town-house built in 1444, and the old castle of St Wilibald, which has been converted into a barrack. There are manufactures of cloth, pottery, and ironmongery. There are besides several breweries. E. has had municipal rights since 908. Pop. (1871) 8051.

Eich'wald, Eduard, Russian naturalist, was born at Mitau, Courland, 4th July 1795, studied at Berlin from 1814 to 1817, and after having travelled in France and England, was appointed Professor of Zoology and Midwifery at Kasan in 1823, travelled during 1825-27 through the countries around the Caspian Sea and the Caucasus, and in 1829 explored the W. of Russia. In 1838 he was named Professor of Zoology and Mineralogy at the Medico-Chirurgical Academy of St Petersburg. He afterwards studied geology and palæontology, and undertook scientific expeditions to Esthonia, Finland, the Tyrol, Italy, Sicily, and Algeria. E. has been a voluminous author. Among his works are *Reise auf dem Kaspischen Meere und in dem Caucasus* (Stuttg. 1834–37); *Mémoire sur les Richesses Minérales des Provinces Occidentales de la Russie* (Wilna, 1835); *Beitrag zur Verbreitung der fossilen Thiere Russlands* (Moscow, 1857).

Ei'der, a river of N. Germany, which rises about 12 miles S. of Kiel in Holstein, and after a course of 100 miles enters the North Sea at Tonning, the capital of the district of Eiderstedt. Throughout the greater part of its course it divides Slesvig from Holstein. It is navigable to Rendsburg, whence ships can pass to Kiel Bay on the Baltic, by means of the Slesvig-Holstein or E. Canal. Much of its course is bordered with costly dykes to protect the adjacent land from inundation.

Eider-Duck (*Somateria*), a well-known genus of *Anatidæ* or ducks, but included in the sub-family of the *Fuligulinæ* or Pochards (q. v.). The genus *Somateria* has the bill divided at its base by feathers, and the front of the bill is flat, whilst its *laminæ* or 'fringes' are very wide. The wings have their first and second quills longest. As in the pochards, the hinder toe is short, with a broad membranous web. The common E.-D. (*S. mollissima*) is found in the N. parts of Britain, but comes further S. in winter. It averages rather more than 2 feet in length. The male is white on the neck and back, the primary and secondary feathers being dull black, and the tertiary feathers white, whilst they droop over the darker wings. The breast and belly are black, with white patches in the flanks. The top of the head is deep black, the sides of the head being white. The bill and legs are green. The colour of the female is a ruddy brown, marked with darker tints. The nest is placed in detached rocks and islands. The eggs are five or six, and are pale-green in colour, and the E.-D. produces two broods annually. The king E.-D. (*S. spectabilis*) is rare in Britain, but common in Greenland. It has a black and white body, and red beak and legs; and the male possesses a warty protuberance on the base of the upper bill. These ducks afford the 'down' used in making quilts and other articles of dress, which is obtained from the nests, and is plucked by the parent birds from their own breasts to cover and warm the eggs during incubation. The eggs and down are successively removed from the nest, the bird laying fresh eggs and supplying new down; whilst ultimately the male bird is called upon to supply down from his breast, and on his darker down being seen in the nest, the fowlers cease their operations. The eggs are very palatable, and the flesh is not unpleasant to taste. About half a pound of down is stated as the quantity obtainable annually from a single nest. The down is imported in the form of balls, weighing each 3 to 4 lbs. These ducks can be domesticated, especially in marine localities. The islands of Britain, Fern Island, Norway, and Sweden, are the chief haunts of the E.-D. in Europe, whilst it is also plentiful on the North American coasts.


Eider-Duck.

Eigg or **Egg Island**, a small hilly island, 6 miles long and 3 broad, belonging to Inverness county, and 12 miles W. of Arisaig. The highest point, the 'Scuir of E.,' is 1339 feet above the sea. E. has a manse and schoolhouse, an old chapel, some Danish remains, and two hamlets, Laig and Kildonan.

Eight-Foil, in heraldry, eight leaves issuing from a central ball; sometimes called a double quatrefoil.

Ei'kon Basil'ike (Gr. 'the royal image'), a book issued in 1649, professedly written by Charles I., whose policy it explained. It was divided into twenty-eight sections, each ending with prayer, and was the work of John Gauden, Bishop of Exeter.

Eil'enburg ('the town on the island,' Celt. *eilean*, 'an island'), a strong town of Prussian Saxony, on an island of the Mulde, here spanned by two bridges. It has manufactures of woollens, cotton, tobacco, and wax, a tilework, and a trade in cattle. Pop. (1871) 10,286.

Eim'beck, properly **Ein'beck**, an ancient town of Prussia, 38 miles S.S.E. of the town of Hanover, on the Ilme, near its confluence with the Leine. Its chief industries are stocking-weaving, tanning, spinning, and manufactures of tapestry and cloth. It was formerly one of the Hanse towns, and in the middle ages was famous for its beer. Pop. (1872) 6382.

Einsied'eln, a town in the canton of Schwyz, Switzerland, 3000 feet above the sea-level, is noted for its Benedictine Abbey, containing a black image of the Virgin, to which miraculous powers are ascribed, and which annually attracts 150,000 pilgrims. Zwingli was parish priest of E. in 1516. The existing abbey dates from about 1720. It has a library of 26,000 volumes and 840 MSS. Pop. (1870) 7633.

Eire, or **Eyre, Justices in.** These were originals of the present justices of assize. They were first appointed in 1176 A.D., with a delegated power from the king to make circuits once in seven years. Under Magna Charta the circuit was made annual. The office having become a sinecure, was abolished by 57 Geo. III. c. 61.

Eis'enach (Lat. *Isenacum*, Ger. *eisen*, 'iron;' 'the place on the water impregnated with iron'), a walled town, the capital and residence of the Grand Duke of Sachsen-Weimar-Eisenach, 45 miles W. of Weimar, is romantically situated in the Thuringian forest. It is a station on the Sächsisch-Thuringisch Railway, and is easily reached from any part of Germany. Pop. (1871) 13,967. Among its principal buildings are the Grand-Ducal residence, the gymnasium, originally a Dominican cloister, where Luther received part of his education, and the churches of St Georg and St Nikolaus, the latter built in the 12th c. It has manufactures of woollens, fustian, worsted, linen thread, pottery, and sealing-wax, dye-works, and many flourishing mills. E. is the birthplace of Sebastian Bach. The castle of the Wartburg (q. v.), where Luther remained in hiding for ten months after the Diet of Worms, and translated a considerable portion of the Scriptures into German, occupies a wooded height in the vicinity.

Eis'enberg ('iron hill-fort'), an old town in the Duchy of Sachsen-Altenburg, on an affluent of the Elster, 2¼ miles from Krossen, on the Weissenfels-Zeitz-Geraer Railway, with manufactures of leather, woollens, linens, shoes, porcelain, and stoneware, and a trade in corn and wood. Pop. (1871) 5261. Among the most noteworthy buildings are the castle of the Grand Duke and a beautiful church in the New Italian style, erected between 1676 and 1692. See Back's *Chronik der Stadt E.* (Eisen. 1843).

Eis'enerz ('iron ore'), a town in a deep valley of Upper Styria, separated from the market-town of Nordenberg by the lofty Erzberg, 5010 feet high. This mountain forms the centre of the

iron and smelting trade of Styria. The mines have been worked for 1000 years. The ore is now quarried rather than mined—the sides of the mountain being cut away in some places to a depth of 30 fathoms, in others even to that of 90 fathoms. The ore is rich, and from it is manufactured a steel unsurpassed in Europe. Pop. (1869) 3850.

Eis'enstadt ('iron town,' Hung. *Kis Marton*), a free town of Hungary in the county of Oedenburg, 7 miles N.N.W. of the town of that name. Pop. (1869) 2476. It possesses a Franciscan monastery, containing the burying-place of the Esterhazy family, who have also a magnificent palace in the vicinity, built in 1683, and enlarged in 1805. In its noble park, on the slope of the Leitha Hills, are splendid greenhouses and orangeries.

Eis'leben (Lat. *Islebia*), a town of Prussian Saxony, 18 miles W. of Halle, and a station on the Halle-Nordhausen-Kassel Railway. Luther was born and died here. Two days before his death he founded the existing Royal Gymnasium. The house in which he was born has been turned into a school, where orphans receive free education. Pop. (1871) 13,436.

Eistoddfods (pron. *eisteff'ods*), the name applied to the periodical assemblies of Welsh bards for competition in native music and song. They are of great antiquity, reaching back as far as the time of Howel Dha. At present they keep alive a certain kind of national feeling, but are powerless to reanimate a dead literature.

Ejec'tion and Intru'sion is a term of Scotch law, E. denoting the violent taking possession of land or a house, and I. denoting entry into and violent detention of the subject. A tenant illegally remaining in possession is liable to an action of E. and I., and unless his defence be instantly verified, he will be required to find security for the violent profits.

Eject'ment. By the Common Law Procedure Act, former procedure in E. is abolished in England. The process is now by writ directed to the person to be ejected and to all entitled to defend possession of the property claimed. When half a year's rent is in arrear, and the landlord or lessor has a right to re-enter for non-payment, he may bring writ of E., and on proof that there were not sufficient goods to satisfy Distress (q. v.), he shall recover judgment and execution. But on the tenant paying rent and costs before trial, proceedings are to cease. The landlord's former remedies are, however, preserved. In an E. under mortgage, the mortgagor's rendering the principal and interest in court shall be deemed a full satisfaction, and the court may compel the mortgagee to recover. The landlord may proceed by Plaint (q. v.) in the county courts to recover rent not exceeding £50 per annum. If the rent be six months in arrear, the landlord may, if he has a right to re-enter under the lease, enter a plaint in the county courts to recover possession of his premises. See DEFORCEMENT.

Ekaterinburg', or **Jekaterinburg**, a town of Russia, government of Perm, on the E. side of the Ural Mountains, and 160 miles S.E. of the town of Perm, with which it was connected by rail in March 1878. It occupies a hilly plain on the highroad to Siberia, is the centre of the mining industry of the Ural Mountains, the largest town in the government and in the Ural region, and has broad straight streets, splendid buildings, including two cathedrals and ten churches, gardens, parks, &c. There are also (1853) a museum of mineralogy and an imperial mint. The cutting and polishing of precious stones is a principal branch of industry, but the prosperity of the town is due mainly to the rich mines in its vicinity. At a short distance are the iron-foundries of Issetsk; 7 miles off are the gold-mines of Beresovsk; and 16 miles distant is Pyschinsk, where the gold is separated from the earth by amalgamation. Pop. 25,133. The town was founded in 1722, and named after the wife of the Czar Peter the Great.

Ekaterinodar', or **Jekaterinodar'** ('Catherine's gift'), a town of Russia, the capital of the Kuban or Black Sea Cossacks, in a swampy district on the Kuban, 100 miles above its mouth. Most of the houses are of clay, though some are of wood, and thatched with straw. E., built in 1792, is the seat of the Cossack Hetman. It has a wooden fort or *kreport*, in the enclosure of which stand the Hetman's residence, the military hospital, and the cathedral. Pop. 9504.

Ekaterinoslav', or **Jekaterinoslav**, a government in S. or New Russia, between Kharkov and Pultava on the N., Kherson on the W., Taurida on the S., and the Sea of Azof and the country of the Don Cossacks on the E.; area 26,037 sq. miles; pop. (1870) 1,352,300. From the southern exposure of the land, apricots, peaches, cherries, mulberries, almonds, figs, vines, melons, and water-melons thrive in the open air. Agriculture and the breeding of silkworms, of Merino sheep, and of cattle are successfully pursued. There are magnificent coal-beds, occupying an area of upwards of 1300 sq. miles.

Jekaterinoslav, the capital of the government, on the right bank of the Dnieper, 250 miles N.E. of Odessa, founded in 1784 by Potemkin, as a summer residence for Catherine II. It has broad streets, but is filthy, and has an unfinished appearance. It is a bishop's see, has extensive cloth manufactures, and is the emporium of the trade to Odessa. Pop. 24,267.

Ek'logite, a kind of garnet rock, composed of light-green smaragdite enclosing crystals of pale garnet. It occurs in the Sau-Alp in Styria, in the island of Syra, and at Münchberg in Bavaria. It is a tough firm rock, and when polished is employed for ornamental purposes.

Ekouk Tank, an irrigation work on the borders of the province of Bombay and the Nizam's dominions in India, 4 miles N. from Sholapore and 205 S.E. from Bombay. A dam of earthwork, with masonry flanks, 7200 feet long and 72 feet high, is thrown across the Adela river, a tributary of the Kistna. The lake thus formed has an area of 6½ sq. miles, and five villages have been submerged; but 35,840 acres have been brought under irrigation. There are three distributaries—two on a high level, 4 and 18 miles long respectively, for monsoon crops; and one, 28 miles long, for perennial irrigation. The water was first distributed in 1871.

Elæag'nus, a genus of Exogenous plants belonging to and forming the type of the natural order *Elæagnaceæ*. In this latter group the plants are trees or shrubs, with exstipulate leaves and unisexual flowers. The fruit is a shelled *achene*. The genus E. itself is represented by the *E. angustifolia*, the 'oleaster' of S. Europe and the Levant, and by *E. parvifolia*, the small-leaved oleaster, which bears clusters of red edible berries, mottled with scaly leaves. The former species is often cultivated in Britain for its silvery foliage. It is sometimes named the 'wild olive.' *Shepherdia argentea* of N. America is also included in this group, and yields an edible fruit.

Elæocarpa'ceæ, a group of Exogenous plants, elevated by some botanists to the rank of a natural order, but by others included in the natural order *Tiliaceæ*, or the Linden (q. v.) order. The typical genus, *Elæocarpus*, is represented by *E. cyaneus* and *E. serratus*. These trees are chiefly East Indian species. The fruit of *E. serratus* is eaten in Ceylon. *E. cyaneus* inhabits Australia. In E. plants the petals are deeply cut, and the anthers dehisce or open at their apices.

Elæococc'a, a plant genus belonging to the *Euphorbiaceæ* (q. v.) or 'spurgewort' order. The seeds afford oils (hence the name), the oil obtained from *E. verrucosa* being used for food in Japan.

Elæoden'dron (Gr. 'oil-tree'), a genus of Exogenous (Polypetalous) plants belonging to the order *Celastraceæ* or the 'spindle-tree' order. The fruit of E. is a stone-fruit or *drupe*, and that of some species (such as *E. Kubu* of S. Africa) is eaten. The fruit of *E. Argan* of N. Africa affords oil. *E. croceum* of S. Africa affords a timber known as 'saffron-wood,' much used in building and for making furniture.

Elagab'alus, or **Heliogab'alus**, the first Roman emperor of Asiatic extraction, was born at Emesa about A.D. 205. His original name was Varius Avitus Bassianus; he adopted that of E. as pontiff and favourite of the Syro-Phœnician Sun-god so named (Syr. *ela*, 'a god,' and *gabal*, 'to form;' 'the forming or plastic god'), which was worshipped at Emesa. Through the intrigues of his grandmother, Julia Mæsa, he succeeded Macrinus, the destroyer of Caracalla, after his rival had been defeated at Antioch (218 A.D.) and subsequently slain. The reign of E., who assumed the name Marcus Aurelius Antoninus, lasted for three years nine months and four days, and was deeply stained by heartless cruelty and by sensual vices of the most loathsome nature. E. was murdered, and his body cast into the Tiber, A.D. 222.

Elambazar', a trading town in the district of Birbhum, province of Bengal, on the navigable Ajai, and is noted for its manufacture of lac ornaments, and has an extensive trade in rice. Pop. 3000.

E'land (*Oreas canna*), a genus of *Antilopidæ* or Antelopes (q. v.), distinguished by having the horns—each about 18 inches long—spirally keeled, but of nearly straight conformation; by the equal-sized limbs, and the presence of a short mane on the neck. Its colour is a light or greyish brown. The tail is tufted and the muzzle broad. The E. is the largest of the antelopes of S. Africa, and may attain the size of a large ox or cow. Its food consists of grasses and herbage, and it is noted for its powers of long abstinence from water. The flesh is accounted very palatable. The E. is gregarious in habits.

El'anet, certain species of Raptorial birds belonging to the the genus *Elanus*, and nearly allied to the kites or *Milvinæ*. Examples are found in the black-winged falcon (*E. melanopterus*), and in the *E. dispar* or black-shouldered hawk. The former occurs in Africa and Asia, and in New Zealand, the latter in America. These birds have the bill broad at its base. The wings are long, and the second quills are the longest. The tail is long and forked, and the outer toe is much shorter than the inner. The genus *Elanoides* is nearly related to *Elanus*, and is exemplified by the swallow-tailed falcon (*E. furcatus*) of America. The wings have the second and third quills longest, and the hinder toe is elongated.

Elaph'rium, a genus of plants belonging to the natural order *Connaraceæ* (q. v.), which is sometimes included in the nearly-allied order *Amyridaceæ* or 'myrrh' order. The genus is represented by the *E. tomentosum*, which yields a resin named *Tacamahac*, whilst Mexican Elemi (q. v.) is obtained from *E. elemiferum*.

E'laps, a genus of poisonous Colubrine (q. v.) snakes, forming the type of the family *Elapidæ*, in which group the head is square, the snout short, and the front teeth of the jaws longest. In the genus *E.* (represented by the *E. fulvius* or bead-snake of N. America) no smooth teeth exist behind the fangs. The Cobra di Capello (q. v.) belongs to the *Elapidæ*.

Elasmobran'chii, an order of *Pisces* or fishes, represented by the Shark (q. v.), Dog-fish (q. v.), Ray (q. v.), Skate (q. v.), and their allies. The order is distinguished by the skull and lower jaw being well developed. No distinct cranial or skull bones can be distinguished, and the skull is cartilaginous in its nature. The spine may be osseous, cartilaginous, or represented by a soft Notochord (q. v.). The scales consist of bony plates, granules, or tubercles, often furnished with spines. The pectoral and ventral fins are developed, the latter being abdominal in position. No clavicles exist. The heart has a *bulbus arteriosus*, which is rhythmically contractile, provided with striped muscular fibres, and possessing several rows of valves. The gills exist in the form of pouches, which open externally by slits (as in sharks), or by a single gill-aperture (as in *Chimæra*). The order is divided into the *Holocephali*, represented by the *Chimæra* or 'king of the herrings;' and the *Plagiostomi*, represented by the sharks, rays, &c. The former group has a single gill-aperture, or persistent notochord; the first ray of the dorsal fin forms a spine, and the mouth is placed at the extremity of the head. The latter subdivision has the transverse mouth placed on the under surface of the body, and the gills open by numerous gill-slits.

Elasti'city, in physical science, is the property possessed by probably all kinds of matter, in virtue of which they tend to recover their original form or dimensions after disfigurement by some external force. No substances, however, are perfectly elastic, *i.e.*, can of themselves perfectly regain their original condition after having been subjected to an appreciable strain. Those which most nearly approach this ideal perfection are the gases, whose E. is defined as the ratio of the increment of pressure to the compression produced by it. The same definition holds for liquids, but their E. is of little practical importance on account of their generally small compressibility. In both liquids and gases the E. is wholly one of volume, form and figure being not of the least consequence. Not so, however, with solids. Here change of form constitutes distortion, and distortion is not necessarily accompanied by change of bulk. It is found that within certain limits the law is practically accurate that the distortion is proportional to the force, or, as Hooke first enunciated it, *ut tensio sic vis*; but for every solid substance there is a certain limiting strain, beyond which E. ceases to act, the *rigidity* or resistance to change of form is overcome, and *fracture* ensues. (See STRAIN.) Plastic solids are those whose E. of figure is very imperfect; and they pass by insensible gradations into *viscous* fluids, which have only E. of volume. Continuous rise of temperature, as a rule, renders solids more and more plastic, till they become liquid and ultimately gaseous; and therefore rise of temperature diminishes E. of figure and increases E. of volume. All these phenomena follow as a direct consequence of the molecular theory of the constitution of matter, when it is considered that the difficulty of permanently altering the relative positions of contiguous particles is greater the closer they are, and especially so if, when condensed, the particles are subject to mutually attractive forces, which are of little moment, on account of the introduction of new dynamical conditions, when the particles are sufficiently separated.

Elasticity, in physiology. Many of the structures of the body possess the property of E., by which movements are effected without the expenditure of force in muscular contraction. Thus there is a strong elastic band termed the *ligamentum nuchæ* in the back of the neck of the large ruminants and pachyderms, stretching from the spinous processes of the dorsal vertebræ to the occiput, by which the heavy head is sustained without muscular fatigue. The larger arteries of the body possess a highly elastic coat, by the agency of which the jet-like pulsation communicated by the heart to the blood is converted into a continuous uniform motion. The lungs and walls of the chest, by their E., assist in ordinary expiration without any muscular action. Muscles are highly elastic, so that after contraction they return to their former length. Finally, elastic structures are found in the neighbourhood of all joints, so as to break the shock in such movements of the body as walking, running, leaping, &c.

El'ater, the name given in botany to the *spiral elastic fibres* contained within certain vegetable cells, and which by their elasticity aid in scattering the spores or germs of such lower plants as horse-tails or *Equisetaceæ*, &c. In many cases these E. are hygrometric, that is, are affected by the varying effects of dryness and moisture.

Elater, a genus of *Coleoptera* (q. v.) or Beetles, forming the type of a distinct family (*Elateridæ*), in which the body is hard, the antennæ short and serrated, and the head sunk in the thorax as far as the eyes. The limbs are also short. They are sometimes named 'spring-beetles,' from the fact that when laid on their backs they can spring into their normal position. Many are luminous in the dark. See CLICK-BEETLES, WIREWORM, &c.

Elat'erite, or **Elas'tic Bitu'men**, is a flexible or elastic mineral substance allied to bitumen, possessed of a blackish-brown colour and a resinous lustre. It burns readily with a yellow flame, giving out a bituminous odour, and as it effaces pencil-markings, it has been called mineral caoutchouc. It was found originally in an old lead-mine in Derbyshire, but it is nowhere abundant.

Elate'rium, a drug used in pharmacy, and obtained from a green mucous or glutinous matter surrounding the seeds of *Ecbalium purgans*. It is prepared by allowing the juice of the ripe fruit to stand until it deposits a sediment, which is dried and collected. It is of a pale-greenish colour, and is a powerful hydragogue cathartic or purgative, and is used in dropsy, &c. Its properties depend on a crystalline substance called *elaterin*. As a drug it was employed by the Greeks and Romans. It varies much in strength, and should be administered at first in $\frac{1}{16}$-grain doses until its proper effect is ascertained.

Elatina'ceæ, or 'water-pepper' order, a group of Exogenous plants, occurring in all quarters of the globe, and distinguished by their being small annuals growing in marshes. The leaves are stipulate and opposite, and the flowers are small and axillary. The sepals and petals vary in number from three to five. The seeds are exalbuminous, and attached to a central placenta. The natural order E. is allied to the *Rutaceæ*. The type-genera are *Elatine*, *Bergia*, and *Anatropa*.

El'ba (Fr. *Elbe*), an island of Italy in the Mediterranean, is included in the province of Livorno, and lies between Corsica and Tuscany, being separated from the mainland by a strait (Piombino) about 5 miles wide. It is the Ilva of the Romans and the Æthalia of the Greeks, the latter of which names is supposed to have been suggested by the smoke of its many iron-smelting furnaces. Area, 90 sq. miles; pop. (1862) 20,240. About 18 miles in length, it varies in breadth from 2½ to 10 miles, while the coasts are bold and deeply indented with good harbours. It is mountainous, and rises to a height of 3500 feet in Monte della Capanna. Among the productions are iron, loadstone, marble, wine, wheat, olives, and Southern fruits. The capital is Porto-Ferraro. The Treaty of Paris designated E. as the residence of Napoleon I., who, however, only remained here from 14th May 1814 till his escape on the 26th February 1815.

Elbe' (Lat. *Albis*, Bohem. *Labe*), the largest river of N. Germany, has its source in numerous springs on the Bohemian side and in the highest part of the Riesengebirgs, 4538 feet above the level of the sea. It flows in a sweeping curve through the N. of Bohemia, past Königgrätz, Melnik, Theresienstadt, and Leitmeritz; then, after making its way through the Mittelgebirgs of Bohemia, it enters the kingdom of Saxony, passing Pirna, Dresden, and Meissen. It then flows past Torgau, Wittenberg, and Magdeburg in Prussian Saxony, and further on it forms the boundary of Hanover and Mecklenburg, Lauenburg and Holstein, passing Hamburg, Altona, and Glückstadt, and falling into the German Ocean at Cuxhaven, after a course of 720 miles. Close on its embouchure its breadth varies from 9 to 13 miles. It drains an area of 55,590 sq. miles, and receives in its course more than fifty affluents, of which the most important on the right are the Iser, the Elster, and the Havel; on the left, the Moldau, Eger, Mulde, and Saale. It becomes navigable at Melnik for the large E. wherries at Pirna, and at Hamburg, by the help of the tide, for the largest merchant vessels. Its navigable course is 520 miles long, 340 of which belong to Prussia. Steamboats carrying freight sail regularly between Hamburg and Magdeburg; passenger steamboats ascend the river from Dresden through Saxony and Bohemia. The development of the trade of the E. was long checked by oppressive tolls and imposts. The Elbe Navigation Act of 25th June 1821 greatly relaxed these. Other ameliorations followed, till at length, July 1, 1871, all existing tolls were abolished.

El'berfeld, a town in the circle of Düsseldorf, Rhenish Prussia, on the Wupper, a little to the S.W. of Barmen, and 30 miles S.S.W. of Köln by railway. It is one of the principal manufacturing towns in Europe, and has a beautiful town-hall, an academy of design, one Roman Catholic and four large Protestant churches, &c. Its chief manufactures are European and Asiatic silks, half-silk fabrics, ribbons, cottons, linens, carpets, india-rubber, cloths, paperhangings, patent leather, buttons, chemicals, machinery, pianofortes, and organs. It is celebrated for the tint and permanence of its Turkey-red dye. There are 229 weaving and spinning factories, with 50 steam-engines, 1120 mechanical looms, and 3746 hand and power looms, employing 8389 men and 2917 women, and producing goods to the value of some £2,000,000 yearly. In addition, there are 29 dye-works, 3 large cotton-printing establishments, extensive bleaching-fields, 2 machine factories, 100 other metal works, 32 breweries, 11 brandy distilleries, &c. Many French artists are here employed as pattern-designers. E. is the seat of several large commercial companies. Pop. (1871) 71,384.

Elbeuf, or **Elbœuf** ('new town,' from Fr. *bœuf*, 'a dwelling,' from the Norse *by* or *biggen*), a town in the department of Seine-Inférieure, France, on the left bank of the Seine, 75 miles N.W. of Paris by railway. It has been noted since the 16th c. for its manufactures, which are now in a more flourishing state than ever, embracing the production of double-milled cloths, woollens, waterproofs, flannels, billiard-table covers, &c. Its chief buildings are the churches of St Étienne and St Jean Baptiste, both of which have beautiful stained-glass windows. E. has an active river trade with Paris, Rouen, and Havre. Pop. (1872) 22,311.

El'bing, a town in W. Prussia, on a navigable river of the same name, 3 miles S. of its entrance into the Haff, and 35 E.S.E. of Danzig by railway. It is modern in appearance, and has eight Protestant churches, a Roman Catholic church, a synagogue, a gymnasium (since 1536), a public library of 22,000 vols., and an institution (*Cowlesche Stiftung*), founded by Cowle, an Englishman, for the upbringing of 400 poor children. Its manufactures are cottons, linens, hosiery, colours, leather, tobacco, beer, chemicals, gold and silver wares, and there are also several large works for the production of machinery and locomotive engines. In 1871, 132 vessels cleared the port, chiefly with wheat, rye, oats, and timber. Kahlberg, a beautiful bathing-place, on the Neerung, is the great summer resort of the Elbingers. Pop. (1871) 31,164. E. was founded by Hermann Balk, a German knight, together with colonists from Lübeck, in 1237. It was an important member of the Hanse League, and became Prussian in 1772.

El'bow. This is formed by the junction of the lower end of the humerus with the upper ends of the radius and ulna. See Arm.

Elburz', a lofty mountain range, extending along the whole southern shore of the Caspian Sea in the Persian provinces of Ghilan, Mazandaran, and Dahistan. The highest summit is believed to be Demavend (q. v.). Elburz or Elbruz is also the name of the highest summit of the Caucasus (q. v.) range.

El'che (anc. *Illici* or *Elice*, Basque *illia*, 'a town,' 'the town on the hill'), an interesting old town of Spain, in Valencia, 16 miles S.S.W. of Alicante, in a sterile, hilly district, surrounded by a plantation of about 70,000 palm-trees, which lends to the place the appearance of an African oasis, and which is itself surrounded by maize-fields, and by plantations of olive and carob trees. Pop. 15,700, who manufacture leather, and carry on a good trade in dates and blanched palm-leaves for processions. To the west of E. is the town of Crevillente (pop. 7787), with many tanks and subterranean aqueducts of Moorish construction.

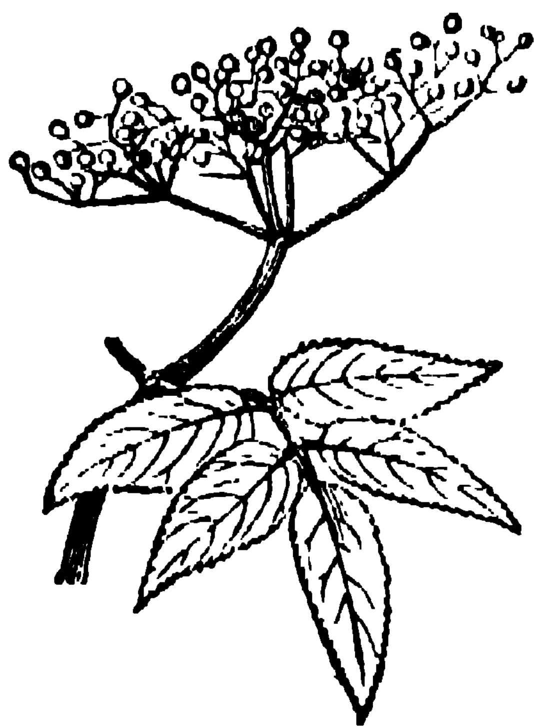
Elch'ingen, a village of Germany, Bavaria, on the left bank of the Danube, 8 miles below Ulm, and the seat of a once famous Benedictine abbey. Pop. 499. Here on the 13th October 1805 the Austrians were defeated by the French under Ney, upon whom the title Duke of E. was afterwards conferred.

El'cho, Lord, the Right Hon. Francis Wemyss-Charteris-Douglas, eldest son of the eighth Earl of Wemyss, was born August 4, 1818, and was educated at Eton and Christ Church, Oxford, where he graduated in 1841. In the same year he entered Parliament as representative of East Gloucestershire, attaching himself to the party of Sir Robert Peel. Having become a convert to free-trade principles, he resigned East Gloucestershire in 1846, but in the following year was returned as a 'Liberal Conservative' for Haddingtonshire, where his family have great local influence. He still represents the same constituency. He enjoyed a brief tenure of office (January 1853 to February 1855) in the Peel-Aberdeen coalition government, but he has not at any period of his career taken a foremost place in the great political movements of his time. He has, however, identified himself with, and laboured with praiseworthy devotion in the furtherance of, some of the most urgent social questions of the age. He may be said to have created the volunteer movement in 1859, and he has most faithfully and assiduously laboured for the increased efficiency of this arm of the national service. He has also devoted much care to the consideration of the game laws, and to the subject of local government for the metropolis.

El'der, literally one of the older men, who in ancient times were naturally appointed to public offices requiring wisdom and experience, was afterwards a person, of whatever age, who held such an office (Gen. l. 7.). It was to the elders of Israel that Moses declared his commission (Exod. xii. 21). Seventy were chosen, along with Aaron, Nadab, and Abihu, to attend Moses on Mount Sinai (Exod. xxiv.); and other seventy were appointed to help him as judges (Num. xi.). When the nation was settled in Canaan, the elders administered the law in the cities (Deut. xix. 12); and the office continued under the judges (Judges ii. 7), the kings (1 Sam. xxx. 26, 1 Chron. xxi. 16), the captivity (Ezra x. 14), and after the restoration (Ezra v. 5, vi. 14). Under the Maccabees, at which time, probably, the Sanhedrim (q. v.) was instituted, they are still mentioned as a separated class (1 Macc. vii. 33). In the time of Christ they are mentioned along with the scribes, chief priests, and council as one of the classes from which the Sanhedrim was chosen; see Luke xxii. 66, in which passage they are spoken of as a body—*presbyterion*. An E. in the Christian Church, into which the title and office were adopted, was a kind of overseer, whose duties were to preach

(Titus i. 9) and visit the sick (James v. 14). The order even included the apostles (1 Tim. iv. 14, 2 Tim. i. 6, 2 John 1, 3 John 1), although elsewhere the apostles are distinguished from them (Acts xv. 6). (See BISHOP.) Elders are also lay officials in Presbyterian churches who act with the presbyters or ministers in the administration of Church discipline and government, having an equal vote with the latter in all Church courts. They are sometimes called *ruling* elders, as distinguished from the *teaching* elders or pastors, as the name, which is a translation of the Gr. *presbyteros*, belongs more properly to the latter than to the former. In the Church of Scotland, the duties of an E., as specified in the *Buik of the Polecie of the Kirk*, ratified at the Assembly of Glasgow, 1581, are as follows:—(1) To watch diligently upon the flock committed to their care, both publicly and privately, that no corruption of religion or manners enter therein. (2) To be careful in seeking the fruit of the seed (of the Word) sown among the people by the pastors and doctors. (3) To assist the pastors in examination of them that come to the Lord's table, and in visiting the sick. (4) To cause the Acts of the Assembly to be put in execution. (5) To be diligent in admonishing all men of their duty, according to the rule of the gospel. (6) To bring things that cannot be corrected by private admonition before the eldership (? kirk-session). (7) Their principal office is to hold assemblies with the pastors and doctors, for establishment of good order and execution of discipline. See *Autobiography and Diary of James Melvill.*

Elder (*Sambucus*), a genus of Exogenous plants, belonging to the natural order *Caprifoliaceæ*, or 'honeysuckles.' The species of E. are small trees or shrubs, with pinnate leaves, and small flowers, arranged in umbellate and racemose cymes, the corolla being wheel-shaped and five-cleft, whilst the pistil has the ovary partly adherent to the calyx, and possesses three stigmata on the ovary. The fruit is a berry. The common E. (*S. nigra*) is a well-known shrub, the young wood of which contains a large amount of soft or cellular pith. It occurs in Europe, N. Asia, and N. Africa, and is found equally at home under a tropic sun and an arctic cold. The flowers yield a volatile oil, and the berries are used in making 'E.-flower wine. Both leaves and inner bark have a purgative action. The flowers also yield a distilled water used in perfume-making and also in confectionery, and known as 'E.-flower water.' E.-flower wine is made in England chiefly at Christmas-time, the berries being gathered mostly in Kent, where there are large plantations of E.-trees. The old wood of E. is hard, and used for making parts of fishing-rods and other instruments. The younger wood is easily wrought, and is used in the manufacture of toys. Other species of E. are the *S. racemosa*, or scarlet-berried E. of S. Europe and Siberia, the juice of whose berries possesses narcotic properties. *S. Ebulus*, or the dwarf E., furnishes a purgative from its inner bark, and its flowers are employed in making E.-flower water. The latter is made by adding 2 gallons of water and 3 oz. rectified spirit to 10 lbs. of E. flowers. About 1 gallon of E.-flower water is distilled from these ingredients.


Elder Tree—*Sambucus nigra.*

El'don, Baron, John Scott, an eminent English lawyer, was born July 4, 1751, at Newcastle-upon-Tyne. His father, William Scott, was a humble man, who at various times was a coal-dealer and a public-house keeper, and made so much money by speculation, that he was able to give his sons, William (afterwards Baron Stowell) and John, a good university education. John was trained at Newcastle and University College, where he gained a fellowship. The most remarkable event in his college career, however, was his elopement with Miss Elizabeth Surtees, a Newcastle lady, and their marriage at Blackshiels in Scotland, November 19, 1772. 'Bessy,' as Scott always called her, proved to him an excellent wife, and nothing could equal his affection for her. At first, owing to the dislike shown to the marriage by 'Bessy's' relatives, the pair were in straitened circumstances, and Scott abandoned his study for the Church (for which he was originally educated) for the study of law, and was called to the bar in 1776. By his extraordinary perseverance and industry, and aided by help from his own and his wife's relatives, with the latter of whom he had become reconciled, he acquired in 1787 a great practice at the equity bar. He entered Parliament, and his promotion under the auspices of Pitt was very rapid. He filled in succession the posts of Solicitor-General and Attorney-General, and Chief Justice of the Court of Common Pleas. Finally, in 1801, as Baron E., he became Lord Chancellor, an office which he held till 1827 in the Addington, Pitt, and Liverpool administrations. In 1821 E. was made an earl, and did not retire from public life till 1835. His wife died in 1831, and he himself followed her in January 3, 1838, leaving a large fortune. E. was a man of sagacious, astute, and vigorous intellect. He was not a wise or deep thinker. He had no living grasp of moral principle, but he knew thoroughly what would work for the time; and therefore, in spite of an absence of any strong convictions, theological or political, he was a determined opponent of parliamentary reform and Catholic emancipation. With the public and in society he was extremely popular through a certain charm of manner; and although he could not write grammatically, his judgments are still greatly valued. See Lord Campbell's *Lives of the Chancellors*, and Twiss's *Life of Lord E.* (1846).

El Dora'do (Sp. 'the golden or gilded land,' from the Lat. *aurum*, 'gold'), an imaginary region in America, supposed to lie between the Orinoco and the Amazon, whose riches were believed to eclipse the treasures of Mexico and Peru. Its capital, Manoa, was said to be partly built of gold, and to stand on a great lake with golden sands, called Parima. The whole country was believed to glitter with veins of gold. Humboldt found a belief in E. D. among the tribes of the Upper Orinoco, and describes a Lake Parima whose rocks of sparkling mica-slate may have given rise to the story. Francisco Orellana, one of Pizarro's companions, descended the Amazon to the sea in search of E. D., and spread a belief in it through Spain, where men became seized with a mania to find the fabulous city. Numerous expeditions sought it, one party setting out as late as the year 1770. Walter Raleigh made his ill-starred expedition to Guiana in hopes of reaching this Utopia, which was as imaginary as the Greek Hesperides. The name is now applied to an auriferous district in N.E. California.

Eleat'ic School, derived its name from Elea on the W. coast of Lower Italy, where its founder, Xenophanes of Colophon, settled about B.C. 560. It included Parmenides, Zeno, Melissus, and to some extent, Empedocles. Before them the two great Greek schools had been (1) the Ionian, or physiological, which explained the production of the world from a primitive substance, such as air or water; and (2) the Pythagorean, or mathematical, which asserted that number, with its two elements, odd and even, combining in unity, was the true cause or principle of all particular existences. The Eleatic criticism on this was that 'out of non-being being cannot come,' and that 'non-being cannot exist.' If, then, being existed, it must embrace all existence. The dependence of real things was assumed to be not only rational (in the sense of corresponding to the general notions formed by the human mind), but even verbal, for the Greeks were then unacquainted with foreign languages, and confounded Greek thought with human. The Eleatics, therefore, resorted to the most abstract and elementary concept—God or The All, the one self-existent, eternal, intelligent, immovable being, not a person distinct from the created world, but underlying and interpenetrating the world and all possible worlds as their true substance and life. The dogma of the system was elaborated by Parmenides. He distinguished between truth, or ideas obtained by the intelligence, and opinion, or ideas obtained by the senses, and therefore modified by organisation. The Eleatic is the great type of consistent Pantheism. See Ritter and Preller, *Hist. Phil.*, 1864; Schwegler, *Hist. Phil.*; Lewes, &c.

El'ecampane (*Inula Helenium*), a genus and species of Composite plants, of an aromatic kind, and which possesses tonic and diuretic properties. It is not common in Britain, but occurs in marshy spots in S. Europe. The root is the valued part of the plant, and seems to depend for its properties on the possession of a starchy principle named *Inuline*. The E. belongs to the *Corymbiferæ* or chamomile section of the *Compositæ*, in which the florets of each flower-head are similar and usually tubular.

Elec'tion, the Doctrine of, was developed from the apostle Paul's view of the relation to each other of the two great divisions of mankind, the Jews and the Gentiles. In the Epistle to the Romans he seeks to explain a material and historical fact, to wit, the repugnance of the majority of the Jews to the gospel, a repugnance which would deprive them of the advantages anciently promised to them, and in a manner give the lie to God, who had promised them salvation. But this partial hardening of Israel, which, as revealed by the fact, entered into the secret counsels of God, was destined to become the occasion of the conversion of the Gentiles. When these should be brought in, then all Israel would also be saved. Meantime individual Jews were sacrificed to the great designs of God, but what were these in comparison? (Rom. ix. 20–24). Judaism in the time of the apostle proclaimed the E. of the Jews and the reprobation of the Gentiles. To oppose this notion, St Paul, in his illustration of Jacob and Esau (Rom. ix.), insisted on this, that Jacob was elected without his merit in order to make the Jews feel that their national privileges would not necessarily make them partakers of the true grace of God, far less give them a monopoly of it. And in following out this idea to its last consequences, he had to set forth that reprobation arose, not from demerit, but from the free will of God. Augustine applied this conception purely to individuals, and made the decree of God unconditional, or entirely independent of the human will. His theory differed from all previous views in respect of the imputation of Original Sin (q. v.), concerning which he held that the will of the natural man is only *free* to do evil, his opponent Pelagius holding that man, though needing the aid of the grace of God, has the power of choosing between good and evil. In the Scholastic period the Pelagian controversy was revived between the Thomists (q. v.) and the Scotists (q. v.). After the Reformation, Roman Catholics, Arminians, and especially Socinians, endeavoured to reconcile the divine decrees with human liberty. Calvinists and Lutherans denied all co-operation on the part of man, although the latter restrict predestination to the elect, and the former in general assert the freedom of the will. See Hodge's *Systematic Theology* (1873).

Election, in law. In England, one is said to have an E. when he has two or more alternatives, but having made his choice, he is bound by it, and may not act inconsistently. For Scotch law see APPROBATE and REPROBATE.

Election Laws, Parliamentary.—Procedure at an E. is regulated by several statutes. One of the most important of these is the Ballot Act (1872), by which secret voting has been for the first time introduced into municipal and parliamentary elections in the United Kingdom. The Act expires on 31st December 1880, unless Parliament shall otherwise direct. The Act makes provisions for the time and place of elections, for the nomination of candidates, for the form and official marking of the ballot paper, for the sealing of the ballot boxes at the close of the E., and for opening and counting the votes, in presence, if desired, of the agents of the candidates. This Act also defines *treating* to be the candidate or his agent paying or being accessory to paying for any meat, drink, or entertainment to any one, to influence his vote. *Undue influence* is defined to be threats of any force, violence, or restraint, or any abduction or fraudulent device by which the exercise of the electoral franchise is impeded or prevented. These offences are punishable by fine or imprisonment, and votes so influenced are void. See BRIBERY.

Election of Scottish Peers.—The sixteen representative peers must be elected from the Scottish peerage. No British peer created since the Union has a title to vote or to be elected; and in the case of the Duke of Queensberry, which occurred immediately after the Union, it was resolved in the House of Lords that a Scotch nobleman created a British peer subsequently to the Union was not entitled to vote in the election of representative peers; and in the case of the Duke of Hamilton, in 1711, it was determined that a Scottish nobleman created a British peer after the Union was not entitled to sit in the British House of Lords. These resolutions were, however, subsequently reversed. When a new Parliament is summoned, the peers of Scotland are called by proclamation to meet and elect their representatives. The E. takes place at the palace of Holyrood. The court of review in all questions connected with the representation of the peerage of Scotland is the House of Lords.

Elections, Parish.—At the E. of guardians and all other elections, the votes are to be taken in *writing*, and the rights of voting in owners and ratepayers are assimilated by 7 and 8 Vict. c. 101. A plurality of votes is allowed; thus, if rated at less than £50, one vote; between £50 and £100, two votes; between £100 and £150, three votes; between £150 and £200, four votes; between £200 and £250, five votes; and if it amount to or exceed £250, six votes. When a person is owner and occupier, he may vote in both capacities.

Elec'tors (Ger. *kurfürsten*, from *kur* (obsolete), 'an elector,' and *fürst*, 'a prince'), were at first in Germany seven great feudatories—the King of Bohemia, the Duke of Saxony, the Markgraf of Brandenburg, the Count-Palatine of the Rhine, and the Archbishops of Trier, Mainz and Köln—who were intrusted to choose the mediæval Roman emperors. The office of Cæsar was in theory open to every baptized man above the rank of a serf, but became bound up with the German kingdom, which was thus likewise rendered elective, after the accession of Konrad I., in 911. The place of election was Frankfurt-on-the-Main, and vote could be given by deputy. The E. were entitled to hold the chief offices under the emperor, to possess the royal dignities except the title of majesty, to retain several electorates at once, to obtain new allodial estates and imperial fiefs without special permission, and to form a distinct college in the diets. Their choice was commonly the heir or a relative of the late emperor, and was generally bought by large concessions, especially if they made an emperor's son King of the Romans in his father's lifetime. In 1648 an eighth elector was added; in 1692 the Duke of Braunschweig-Lüneburg received the dignity; and in 1803 the electorates of Würtemberg, Baden, Hesse-Cassel, and Salzburg were added, and those of Mainz and Trier set aside. The office was abolished in 1806, but the title elector was held by the Elector of Hesse-Cassel till 1866.

Electors, Qualifications of. In counties, the lands or tenements giving right to vote may now be of any tenure, and may be held in fee, or for life, or for a term of years, or by mere occupation. No trustee or mortgagee can vote unless in possession of the rents and profits of the estate; but the mortgager, or *Cestui que Trust* (q. v.) in possession, may vote. No one is qualified to vote for the county in respect of any freehold house occupied by himself, nor in respect of a copyhold or leasehold tenancy occupied by himself or by another, if the occupancy confer the right of voting for any city or borough, whether the right has been actually acquired or not. All freeholders of inheritance and for life (provided these last shall be in actual occupation, or shall have acquired their freeholds by devise, or marriage, or marriage settlement, or promotion to any benefice or office) are qualified to vote, if their freehold be of the clear yearly value of 40s. above all charges. Freeholders for life, who are not in occupation themselves, or who have not acquired their estates in any of the ways just mentioned, and persons seised at law or in equity for life or lives, or for any larger estate of copyhold or other tenure, not being freehold, are qualified to vote if their property be of the clear annual value of £5 over all rents and charges payable out of or in respect of the same. Lessees or assignees of tenements of whatever tenure for the unexpired residue of any term originally created for not fewer than sixty years (whether determinable on a life or lives or not) of the clear yearly value of £5 above rents and charges, or for the unexpired residue of any term originally created for not less than twenty years of the clear yearly value of £50, provided that no sub-lessee or assignee of any under-lease shall have a right to vote in respect of such term of sixty or twenty years, unless he is in the *actual* occupation of the premises, are qualified to vote. Occupiers as tenants of any lands or tenements at a yearly rent of not less than £50 are qualified to vote by the Reform Act of 1832; and all occupiers as owners or tenants of any lands or tenements within the county of the rateable value of £12 a year or upwards are qualified by the Representation of the People Act, 1867.

Until the passing of the Reform Act of 1832, the right of election of members for cities and boroughs depended on local usage. Some of these rights were retained in 1832, when the franchise was bestowed on every occupier of a house of £10 yearly value. The Act of 1867 extends the borough franchise to all occupiers of houses who have resided in them for twelve months

on the 31st July of any year, and have been rated for poor rates and paid their rates up to the previous 5th January. The qualification of a lodger is absolute occupation of lodgings of £10 yearly value if let unfurnished, with twelve months' residence.

In Scotland, by the Act of 1868, every man is entitled to be registered as a voter for a county member who for six calendar months preceding 31st July has been the proprietor of lands and heritages, as appearing from the valuation-roll of the county, of £5 yearly value after deduction of burdens, or who has been in the actual personal occupancy as tenant of lands and heritages within the county of the annual value of £14 or upwards, as appearing on the same valuation-roll. By the same Act, the borough franchise is conferred on all occupiers of houses paying rates. In both cases the franchise is subject to conditions relative to payment of taxes.

In Ireland, in boroughs, the Act of 1868 reduces the qualification to £4 yearly value, with conditions of registration, six months previous occupancy, and the payment of all rates due for more than one half year. No alteration has been made in the county franchise by the Representation of the People (Ireland) Act, 1868.

In the universities, the electoral suffrage is independent of residence, property, or occupancy; being vested in the case of Oxford and Cambridge in the doctors and masters of arts, so long as they keep their names on the books of their respective colleges. For the University of Dublin, the suffrage is vested in the fellows, scholars, and graduates; for the University of London, it is vested in the graduates, constituting the Convocation of the University, whose names are for the time being on the registry; and for the Scotch universities, it is vested in the members of the general council, whose names are likewise registered.

Elec'tric Clock is a timepiece whose direct motive power is electricity. The name is, however, frequently applied to an ordinary clock which is regulated by electric currents transmitted at intervals from a standard clock. As examples of purely electric clocks, we may mention those of Mr Alexander Bain of Edinburgh and Mr C. Shepherd of London. About 1843 Bain, availing himself of Oersted's discovery of the action upon a magnet of a continuous electric current, invented an electro-magnetic pendulum, and employed it to drive a clock-train. The bob of this pendulum consists of a hollow coil of insulated wire, whose terminals are connected with two insulated springs fixed at the point of suspension of the pendulum. The N. poles of the two permanent bar-magnets project, one at each side, into the horizontal bore of the coil, and over them the pendulum oscillates freely. When the coil is traversed by a current, it becomes magnetised, and is repelled by the one bar-magnet and attracted by the other, the pendulum thus marking one half oscillation. By this motion the current is broken by a sliding bar moved by the pendulum, and the bob returns through the action of gravity. Its momentum carries it and the slider sufficiently far so as to complete the circuit and remagnetise the coil, and thus the oscillation is maintained and the clock-train driven in the usual manner In Shepherd's E. C. an ordinary pendulum is maintained in vibration by the constant impact of a small weight. An armature of soft iron, movable on a pivot, is raised at every right-hand oscillation of the pendulum by an electro-magnet, and the armature transmits its motion by levers to the weighted arm, which on the breaking of the circuit is retained by a detent. The left-hand oscillation of the pendulum releases the weight, and in falling it gives a steady impulse to the pendulum. The wheelwork and hands are propelled by distinct electric currents, whose circuits are completed by the pendulum touching contact springs. Powerful batteries are required for Shepherd's E. C., and these call for much attention. As a time-keeper it surpasses Bain's, but experience has proved that in all clocks propelled directly by electricity, without the intervention of a regulating clock, there abides an element of uncertainty of action that is unsatisfactory, and that has influenced their rare adoption. Much greater success has attended the application of electricity to regulate ordinary clocks, and to keep them in perfect accord with a standard clock. This is accomplished by the transmission at regular intervals of an electric current from the standard clock to the pendulum of the subsidiary clock, which is thereby retarded or accelerated as the case may be, and made to beat second for second with the standard clock. Any number of secondary clocks may thus be controlled by a standard clock. The controlling system of Mr Jones of Chester, in which a modification of Bain's pendulum is employed, has been in successful operation in many towns of the United Kingdom since 1857. It is on this principle that the great national regulating system is worked. The standard clock at Greenwich, which itself is regulated by astronomical observation, is connected with one or more clocks in all the larger and more important towns throughout the country, and by a very perfect combination of batteries, relays, and electro-magnets retards and accelerates these as the case may be, and fires time-guns at certain hours. Mr F. J. Ritchie of Edinburgh has given great attention to this subject, and has distributed throughout that city his 'electro-sympathetic clocks,' which work in such perfect unity, that if one goes wrong it at once affects all the others, in a way, however, which does not influence the time-indications of these. See Mr Ritchie's paper before the Royal Scottish Society of Arts.

Electric Fishes. See ELECTRICITY, ANIMAL.

Electri'city. Among the ancients, the properties possessed by certain bodies, when rubbed, of attracting small pieces of light material was generally known. The phenomenon obtained its name from the substance by which it was first observed, *elektron*, or amber; but it is now recognised that every kind of matter is similarly affected, that friction is always attended with the production of E., but that, in many instances, the peculiar molecular condition which constitutes the electrified state is so speedily lost that all trace of electrification is gone before there is time to make the necessary search. Viewed as an exact science, E. is appropriately termed *electrodynamics*, which naturally divides into *electrostatics* and *electrokinetics*. The former treats of E. in equilibrium, and discusses all phenomena which are usually included under the name *frictional E.*; and the latter treats of E. in motion, and is synonymous with the term *galvanism*.

Electrostatics.—The first thing to be considered is *electrification*, and this may be effected in several ways, as shown by the following experiments (see Thomson's *Electrostatics and Magnetism*, and Maxwell's *Electricity and Magnetism*):—*Experiment I.*—Take a piece of glass and a piece of resin, neither of which exhibits any electrical phenomena; rub them together, and then separate them. They will be found to attract each other, Take another pair, treat them similarly, and suspend them so as to have as free motion as possible in azimuth. It may then be observed—

1. That the two pieces of glass repel each other.
2. That each piece of glass attracts each piece of resin.
3. That the two pieces of resin repel each other.

Bodies which exhibit these phenomena are said to be *electrified*; and those which, like the glass, repel the glass and attract the resin are vitreously or *positively* electrified, while those which attract the glass and repel the resin are resinously or *negatively* electrified. The indication of these two kinds of E. by opposite signs is very appropriate, but the application of the positive sign to one rather than to the other is purely arbitrary. Electrified bodies always act upon each other in accordance with the law indicated above, that like kinds repel each other, unlike kinds attract. If a small light pith ball be suspended by means of a silk thread, it may be electrified by contact with either the glass or the resin, and may then be employed as an electroscope, or instrument for showing the kind of E. with which a given body is charged. *Experiment II.*—Suspend by a silk thread from the lid of an unelectrified metallic vessel, also suspended by means of silk threads, an electrified piece of glass, so as to hang freely in the inside of the vessel without touching it; then it may be shown that the outside of the metallic vessel is vitreously electrified, and that the electrification at any point is quite independent of the position of the glass in the interior, and disappears if the glass be removed without touching. The outside vessel in this case is electrified by *induction*. No force, either of attraction or repulsion, can exist between an electrified body and a body not electrified; and hence when bodies not previously electrified are acted upon by an electrified body, it is because they have become electrified by induction. If the glass had been suspended outside the vessel instead of inside, inductive effects would have been apparent; but in this case the outside surface nearer the glass would have been

resinously electrified, and the further portion of the surface vitreously electrified; whereas in the original case the whole exterior was charged with vitreous, and the whole interior with resinous E. *Experiment III.*—Let things be as in Experiment II., but let further a second metallic body be suspended by silk threads near the first. Bring now a metal wire similarly suspended, so as to touch simultaneously the exterior surfaces of the two bodies. The first will then be found to have lost some of its electrification, while the second has become positively electrified—electrified by *conduction.* If a silk thread or a rod of glass or resin had been used instead of the metal wire, no transfer of E. would have occurred. Hence we have two groups into which matter may be divided, *conductors* and *non-conductors* or *insulators*—or, more correctly, good conductors and bad conductors, for all substances resist the passage of E., and all conduct E., though in very different degrees. The metals are good conductors; air, gases generally, resins, glass, rubber, paraffin, silk, &c., are good insulators. If in the above experiment the wire connecting the metallic bodies be removed, and the glass taken out of the vessel without touching it, this vessel will be found to be negatively, while the second body is positively, electrified. If the connection between the bodies be renewed, all electrification will disappear, thus showing that the electrifications are equal and opposite. *Experiment IV.*—Let there be two insulated hollow metallic vessels, A and B, the first as in Experiment II., and the second having the resin, from friction with which the glass was electrified, freely suspended in its interior. The exterior surfaces of A and B will be respectively vitreously and resinously electrified. Connect A and B by means of a metal wire, and all electrification will disappear, thus showing that the charges are equal and opposite. Remove the wire, and take the glass and resin out of their respective vessels; then A will be found to be resinously, and B vitreously, electrified. These charges also are equal and opposite, as may be shown either by reconnecting the bodies with the wire, when all electrification will disappear, or by introducing them both without touching into a large hollow conducting vessel, when no electrification will be apparent in its exterior surface. We may thus charge a vessel with a quantity of E. exactly equal and opposite to that of a given electrified body without diminishing the charge on the latter. *Experiment V.*—Charge the vessel B, as above, with a certain quantity of positive E., which we may call for convenience a unit, and introduce it into the interior of a larger insulated conducting vessel, C. If B be made to touch the inside of C, it will be found upon removal to be completely discharged, while C will be charged with a unit of positive E. Recharge B, and repeat the same operation (C being still charged), and the charge on C will be doubled. By repetition of this process, C may be charged with any number of units below a certain limit. From this experiment we observe further that electrification exists only at the surface of the conductor; that an uncharged body introduced into the interior of a conductor remains uncharged, and therefore cannot be attracted or repelled by the electrical forces, and that therefore these electrical forces must be in equilibrium at every point in the interior of a conductor.

Since forces of repulsion or attraction exist between electrified bodies according as they are similarly or oppositely charged, the question naturally arises, upon what does the intensity of the force depend? To solve this problem Coulomb invented his Torsion Balance (q. v.), by means of which, from numerous experiments, he established that the force between two electrified bodies was directly proportional to the charges, and inversely proportional to the square of the distance separating them. To express this as a mathematical quantity, an exact definition of what is meant by unit charge must first be given. Unit of E. is defined as *that quantity which, when placed at unit distance from an equal quantity, will be repelled with unit force*—where unit force is that force which, acting on unit mass for unit time, will make it move with unit velocity. Hence the repulsive force between two bodies charged with $+e$ and $+e'$ units of E. respectively, and separated by a distance r, is $F = \frac{ee'}{r^2}$. If one be charged with negative E., that is, if e or e' change sign, this expression will also change sign, and the force will be attractive. To establish this law by direct experiment is not possible beyond a certain approximation; for there are several disturbing causes, which are unavoidable, and for which allowance must be made. The chief cause is the mutual inductive action of the bodies upon themselves, altering the original superficial distribution of E. Another is the inductive action upon bodies in the vicinity, and a third is the imperfection of insulation, on which account the charges are constantly being dissipated. A strictly rigid proof of this law is not, however, awanting. It is an exact mathematical deduction from the results of Experiment V.; for it may be shown that the law of the inverse square is the only law which satisfies the condition that at every point within an electrified conductor the electrical forces are in equilibrium. Now this is the law which holds in the case of gravitation, and accordingly all the theorems given by Newton regarding the attraction of a uniform spherical shell will be true for a charged conducting sphere. The electrical distribution will be uniform over the surface, or in other words, the *electrical density* will be the same at every point. The electrical density at a point on the electrified surface is the limit of the ratio between the charge upon a small circular space whose centre is the point, and the area of that space, as the radius of the circle is diminished indefinitely. Now the resultant force at any point on the conductor is proportional to this density, and acts outwards in a direction at right angles to the surface; for if it did not, there would be a transfer of E. *along* the surface of the conductor, *i.e.*, there would not be that electrical equilibrium which experiment shows always exists. On a conductor of other shape than a sphere, the density will vary for each point. Thus on a narrow elongated body the E. will be more condensed at the ends than at the middle, and a greater condensation always takes place at sharp projecting points of a conductor than on the rest of the surface. Accordingly, at such points of great condensation, the outward resultant force may be of such intensity as to expel the E. condensed there into the surrounding medium, thus rapidly dissipating the charge on the conductor. When an uncharged conductor is brought near a positively-charged conductor, a negative charge is induced on the nearer surface of the former. As they are brought closer and closer, the inductive action becomes stronger and stronger, and the electric densities of the charges greater and greater, till at last the resultant forces may become so intense as to overcome the insulating power of the air, and give rise to a disruptive discharge through the air between the surfaces. This discharge usually takes the form of a spark, by which almost the whole electrification is discharged at once; but in certain circumstances other forms, such as the electric glow and the electric brush, are produced. The electric glow takes place in the air surrounding a sharp point of an electrified conductor, when by the inductive reaction of another conductor the electric density is increased till it overcome the insulating power of the air. The air in the immediate vicinity of the point becomes really a conductor; but at a certain distance insulation predominates, and here the glow terminates. If the particles of air were stationary, the charge would be retained; but the particles being free to move, are electrified and driven off, and are then replaced by new unelectrified particles. These are, in their turn, electrified and repulsed, chiefly along the line of intensest force, which extends in a direction straight out from the point, and is made evident by the appreciable current of air which exists. This glow may be seen sometimes during a thunderstorm round the extremities of lightning-conductors, whose virtue lies in their pointed character; for the induced E. is so condensed that it draws, as it were, the E. from the clouds by a gradual process, and not by a series of sudden discharges, as would otherwise be the case. The electric brush is produced round a blunt point or small ball, and consists of a succession of discharges, ramifying into the air, and producing a sound whose pitch depends upon the rapidity with which the discharges take place. No current of air, however, accompanies this discharge. When a series of successive discharges has taken place through the air, a peculiar odour may be made sensible. This odour is now known to be due to the formation of ozone, an interesting and in many ways peculiar allotropic form of oxygen.

When two oppositely-charged conductors are separated, an attractive force has to be overcome, and work, therefore, must be done. Accordingly every charged conductor possesses Energy (q. v.) or power of doing work, in virtue of its electrification; and this energy is proportional to the charge multiplied by another quantity which is called the *potential.* Now the energy evidently falls off as the distance from the conductor is increased, and therefore the potential also must diminish, be-

coming zero at infinity. The potential of a charged conductor at a given point may be defined as the work which must be done to remove unit of negative E. from that point to an infinite distance, supposing the distribution not to be influenced during the operation. Accordingly the work done in removing this unit from one given point to another may be represented by the difference of the potentials at these points. Suppose, then, a spherical conductor, of radius R, and charged with e units of E. Let P_1 P_2 be any two contiguous points, distant r_1 r_2 from the centre of the sphere respectively; and let V_1 V_2 be the potentials at these points respectively. If F be the resolved force along $P_1 P_2$, the work done in removing unit of negative from P_1 to P_2 is $F.\ P_1 P_2 = V_1 - V_2$, in accordance with the definition. If r_1 and r_2 are nearly equal, F may be taken as being $\frac{e}{r_1^2}$ or $\frac{e}{r_2^2}$. Hence $V_1 - V_2 = F(r_2 - r_1) = \frac{e}{r_2} - \frac{e}{r_1}$, an equation which is satisfied if $V_1 = C - \frac{e}{r_1}$, $V_2 = C - \frac{e}{r_2}$. Hence the potential at the surface is $V = C - \frac{e}{R}$; and, therefore, the increase of potential in passing from the surface to a distance r is $\frac{e}{R} - \frac{e}{r}$; so that the *potential* of the conductor is $\frac{e}{R}$, being the work required to remove unit of negative E. from the surface to an infinite distance. For points at the same distance from the centre the potential is the same—so that no work is done in passing from any one such point to another—*i.e.*, there are no electrical forces to be overcome. All such equi-potential points must be on the surface of a sphere concentric with the conductor, which sphere is, therefore, an equi-potential surface; and the resultant electric force, at every point, must act in a direction perpendicular to the equi-potential surface which passes through that point, since, as has been seen above, there can be no force along the surface. Further, every point inside the conductor is in electrical equilibrium, so that no work is done against the electrical forces in passing from one such point to another. Therefore the potential is the same for every point inside the conductor, and this value is called the potential of the conductor, and is equal in the case of the sphere to the charge divided by the radius. The ratio of the charge on any conductor to its potential is termed the *capacity* of the conductor. This quantity, potential, in electrical science, has exactly the same relation to E. which temperature has to heat, which pressure has to fluid, and is as important in electro-dynamics as these are in their respective sciences of thermo-dynamics and hydro-dynamics. Fluid, heat, and E., all tend to pass from one place to another, if the pressure, temperature, and potential respectively be greater in the first place than in the second; and no such transfer occurs unless such difference exist. The charge on a conductor is numerically equal to the capacity multiplied by the potential; the potential is the charge divided by a distance; and the capacity, therefore, must be of the same dimensions as distance, *i.e.*, linear. Further, the potential at any point due to a system of conductors is the sum of the potentials due to each conductor.

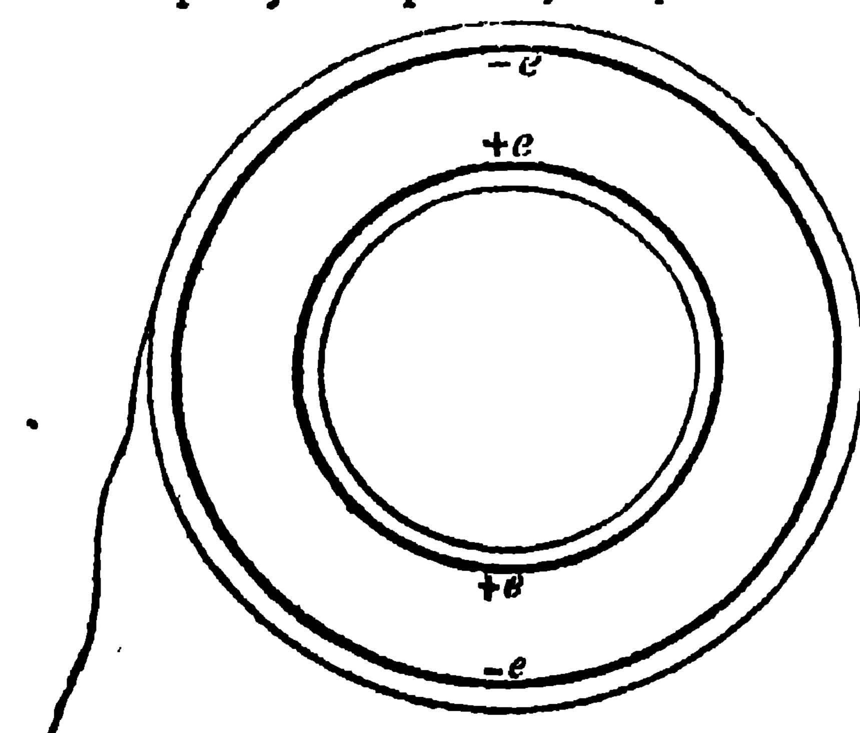


Fig. 1.

Let there be now two concentric conducting shells, separated by air, the inner charged with a quantity $+e$ **of E., and the outer in connection with the earth, and therefore at zero potential. Experiment shows that no electrical forces exist in the substance of the outer shell, and accordingly there must be a quantity $-e$ induced in its inner surface. Let R r be the radii of the inner and outer shells respectively. The potential at any point in the interior of the outer shell as far as it depends upon $-e$ is $-\frac{e}{r}$; and therefore the total potential at any point in the inner shell is $\frac{e}{R} - \frac{e}{r}$. If the inner shell be in connection with a machine whose potential is V, we have the equation** $V = \frac{e}{R} - \frac{e}{r} = \frac{et}{Rr} = \frac{et}{R^2}$ nearly, if t be the thickness of the separating layer of air, and be small in comparison to the radius of either shell. Hence the capacity is $C = \frac{e}{V} = \frac{R^2}{t}$, that is, is directly proportional to the surface, and inversely proportional to the thickness of the insulating layer. Insulating media, when considered with reference to induction, are called *dielectrics* after Faraday; and a system of two conductors whose opposed surfaces are separated by a thin stratum of a dielectric is an electric accumulator, and its capacity is measured in the same way as that of the spherical jar, being directly proportional to the area of the opposed surfaces, and inversely proportional to the thickness of the dielectric. Faraday discovered that the capacity of such an accumulator depends on the nature of the dielectric as well as on the dimensions and relative positions of the conductors; and that when glass, shell-lac, or other insulating medium is substituted for air, the capacity is increased in a ratio different for each dielectric. This ratio was named by Faraday the *specific inductive capacity* of the dielectric. It is unity for air and other gases, and is greater than unity for all other known substances. Returning to our spherical jar, we may write its potential as $V = \frac{et}{R^2}$, where t is now a quantity directly proportional to the thickness and inversely proportional to the specific inductive capacity of the dielectric. The potential energy of any electrified system or the amount of work which it could perform is, as proved by Helmholtz, $E = \frac{1}{2} eV$. Hence the potential energy of the concentric shell arrangement is $E = \frac{1}{2} \frac{R^2 V^2}{t}$; while that of a simple spherical conductor at the same potential is $E = \frac{1}{2} RV^2$. This will give an idea of the much greater energy possessed by a Leyden jar (see ELECTROSTATIC INSTRUMENTS) than by a simple conductor of the same dimensions and potential. When an accumulator, a Leyden jar for instance, has been electrified for some time and then discharged, it is found, for certain dielectrics, to become recharged, and may again be discharged. This recharge, which is always much less than the actual charge, is called the *residual charge*, and upon Faraday's widely-accepted theory of action through a medium is to be referred to the polarisation of the dielectric, which constitutes induction, and which is the 'essential function both in the first development and consequent phenomena of electricity.'

Electrokinetics.—The friction of two different substances is always attended with the production of E.; but in certain instances, probably in all, simple contact and separation are sufficient to give rise to a difference of potential. For example, if a disc of copper and a disc of zinc be placed in contact and then separated, the zinc is found to be positively electrified, and the copper negatively. While they are in contact, an electro-motive force, due in some hidden way to the chemical affinity of the substances, seems to act from the one to the other so as to produce a difference of potential. This same difference of potential is produced if the contact be made not directly but by means of any metallic connection, provided the system be at a uniform temperature. Thus if a disc of iron be introduced between the zinc and the copper the difference of potential between the terminal pieces will be exactly the same as if simple contact were made without the presence of the iron; and further, this difference is equal to the sum of the difference of potential between the zinc and iron and the iron and copper. Accordingly a circuit formed of a number of different metals at the same temperature will be in electrical equilibrium as soon as each has acquired its proper potential. From such an arrangement a current cannot be obtained. If the junctions, however, be at different temperatures, the contact forces will not generally balance, and, as first discovered by Seebeck, there will result a current whose energy finds its equivalent in the thermal energy

expended in rendering the temperature of the circuit unequable. (See THERMO-ELECTRICITY.) If the discs of copper and zinc, after having been placed in contact and separated, are immersed in a compound liquid, they are at once reduced to the same potential. This loss of electrical energy has its equivalent in the work done in decomposing a certain quantity of the liquid. Bring the metals into contact again, and the same set of operations may be repeated. This successive differentiation and equalising of potentials may be made to take place simultaneously by connecting the immersed discs by a metal wire. Let Z be the zinc and C the copper, connected above by a wire, and immersed below in a compound liquid. In virtue of the metallic contact, Z becomes positively and C negatively electrified. In the liquid, however, they are reduced to the same potential, and therefore there must be a passage of E. through the liquid in the direction of the arrow from the place of higher to the place of lower potential, accompanied by a simultaneous flow of E. through the wire from C to Z, in order to restore the difference of potential at the point of contact. This is the fundamental principle of the Voltaic Battery, under which heading a description of the various kinds now in use, and a consideration of the electrolytic processes (see ELECTROLYSIS) which attend their action, will be found. Since the current must set, upon this theory, from the copper to the zinc through the circuit, the copper is termed the *positive* pole, and the zinc the *negative*—a nomenclature which must not be confounded with that of contact E.

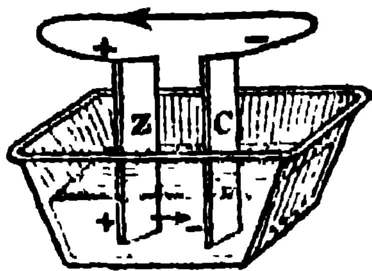


Fig. 2.

If a conductor be connected with the poles of a battery, a current is set up, whose strength is measured by the number of units of E. which pass through every section in the direction between the electrodes in unit time. This current is due to the difference of potentials of the poles, or the electro-motive force of the battery. Now every conductor offers resistance to the passage of a current; and according to the law given by G. S. Ohm in 1827, and known as *Ohm's Law*, this resistance (R) is connected with the electro-motive force (E) and the intensity of the current (I) by the formula $E = RI$, or, the electro-motive force, acting between the extremities of any part of a circuit is the product of the intensity of the current and the resistance of that part of the circuit. The most delicate experiments which modern science is capable of fully bear out this law, which offers a method for comparing the resistances of different conductors by observing the different intensities produced for the same electro-motive force. If a number of wires of the same substance, but of different lengths and cross-sections, be taken and compared as to their resistances, it is found that the resistance is directly proportional to the length, and inversely proportional to the cross-section, a relation which has a close analogy in the flow of water through tubes. The current in overcoming this resistance must, in accordance with the conservation of energy, do internal work, and the equivalence of this internal work we find in the heat generated throughout the circuit. Joule, Lenz and Jacobi, and Riess, working independently, established by experiment that the heat developed is proportional to the square of the current; and Joule further, by careful measurement of all the quantities involved, verified the equation, which may be obtained from theoretical considerations, $JH = I^2Rt$, where J is Joule's equivalent, H the heat developed, I the intensity, R the resistance, and t the time during which the current flows.

When a number of conductors are arranged serially, *i.e.*, end to end, the resistance of the whole series is equal to the sum of the resistances of the conductors taken separately. If the conductors be arranged in *multiple arc*, that is, if they are placed side by side and their extremities put in contact with the same two points, the reciprocal of the resistance of the multiple conductor is equal to the sum of the reciprocals of the component resistances. The reciprocal of a resistance is called the conductivity; hence this last statement may be put thus:—The conductivity of a multiple conductor is the sum of the conductivities of the component conductors. Let R_1, R_2, R_3, &c., be the resistances of a set of conductors, and let R be the total resistance of the system. Then for serial arrangement $R = R_1 + R_2 + R_3 + \ldots$; and for multiple arrangement

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots\ldots$$

Now, in the multiple arrangement, the electro-motive force is the same for every several conductor, because each is in connection with the same electrodes, or metallic terminals of the battery circuit. Hence $E = I_1R_1 = I_2R_2 = \ldots\ldots = IR$, where I is the total intensity of the current, and R the total resistance, as above. Therefore the intensity of the current which flows through any one branch is $I_1 = I\,\frac{R}{R_1}$; from which we conclude that when a current flows through a circuit, which divides into two or more arcs, the current splits up in such a way that the part along any single arc is inversely proportional to the resistance of that arc, or directly proportional to its conductivity. In making measurements of resistance, it is necessary to have a definite and convenient *unit*. The unit now almost universally employed is that fixed by the British Association in 1863, sometimes called the B. A. Unit, but more commonly an *Ohm*. This unit is professedly a resistance which, expressed as a velocity, is ten millions of mètres per second; but in reality it is the resistance of a wire formed of an alloy of silver and platinum of a definite length and cross-section, and at a certain temperature. From a comparison with this, permanent coils of any number of units of resistance may be formed, and these may then be employed for the determination of any unknown resistance. The determination of resistances can be made by either of two ways, in which the result is independent of the variations of the electro-motive force and internal resistance of the battery. The one method is by means of the differential galvanometer, an instrument which will be described when we come to treat of electro-magnetism; but the most convenient method, for which an ordinary mirror galvanometer is all that is necessary, is by means of an arrangement of conductors known as Wheatstone's Bridge, after the name of the contriver. It consists essentially of six conductors connecting four points. In one (BC) a voltaic battery is introduced, giving rise to an electro-motive force (E), acting from B to C. The current between the points O and A is measured by a galvanometer. The problem to be solved is, under what circumstances is the current from O to A zero. Let the potentials at the different points be represented by the letters A, B, C, O, and let R, R_1, r, r_1, be the resistances in BO, OC, BA, and AC respectively. There is no current through OA; therefore the current from C to O must be equal to the current from O to B, and the current from C to A equal to that from A to B. Hence from Ohm's law, we have—

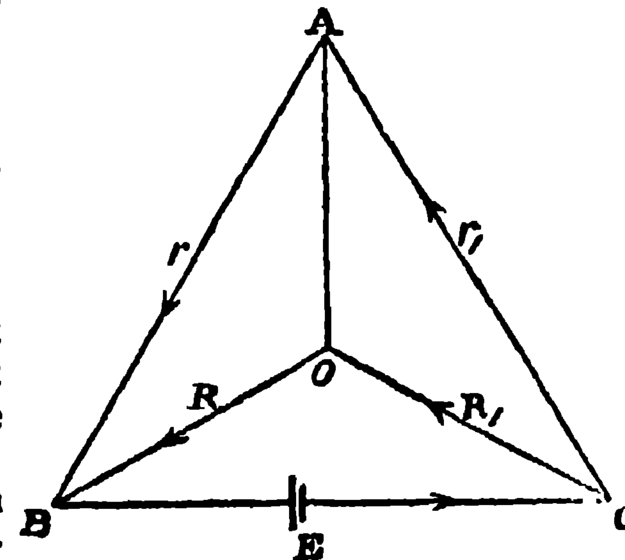


Fig. 3.

$$I = \frac{C - O}{R_1} = \frac{O - B}{R} \therefore O = \frac{CR + BR_1}{R + R_1}$$

and

$$I' = \frac{C - A}{r_1} = \frac{A - B}{r} \therefore A = \frac{Cr + Br_1}{r + r_1}$$

But $O = A$, because there is no current in OA, and therefore $Rr_1 = R_1r$ or $r : r_1 = R : R_1$. Hence, if R and R_1 be coils of known fixed resistance, and r an unknown resistance, the introduction into the arc CA of a box of resistance coils, by which any resistance between certain limits may be thrown in, gives an easy method of finding r by merely adjusting r_1 until no effect is observed upon the galvanometer. The resistances of metallic conductors vary considerably, and it is interesting to observe that if the metals be arranged in the order of their electric conductivities, the table agrees exactly with a table drawn up in a similar manner for heat conductivities. Beginning with the best conductor, the following list according to Regnault indicates the relative positions of the commoner metals—silver, copper, gold, cadmium, zinc, tin, palladium, iron, lead, platinum, mercury. The resistance is also considerably affected by temperature. In the case of copper, palladium, and platinum, and probably all pure metals except the magnetic ones, the resistance would appear to vary directly as the absolute temperature. From experiments made by Professor Tait and his students it would appear that the rate of increase of resistance of iron with temperature under-

goes a peculiar and sudden change at about a dull red-heat—the same temperature at which iron loses its magnetic properties, and at which also the *reglow* during cooling occurs, first observed and described by Prof. Barrett. Nickel presents the same peculiarities, but at a much lower temperature. The electric resistance of insulators being so great, is only determinable approximately, and a rise of temperature seems to diminish the resistance. In experimenting, care must be taken that the effects of surface conduction, which is often much greater than true conduction, are thoroughly eliminated. In investigating the resistance of liquids, great difficulty is experienced in overcoming electrolytic action. See ELECTROLYSIS.

In 1820, while lecturing to a few advanced students at Copenhagen, H. C. Œrsted observed that a wire connecting the poles of a voltaic cell affected a magnet in its vicinity. Subsequent experiments showed that the magnet always tends to set itself perpendicular to the direction of the current.

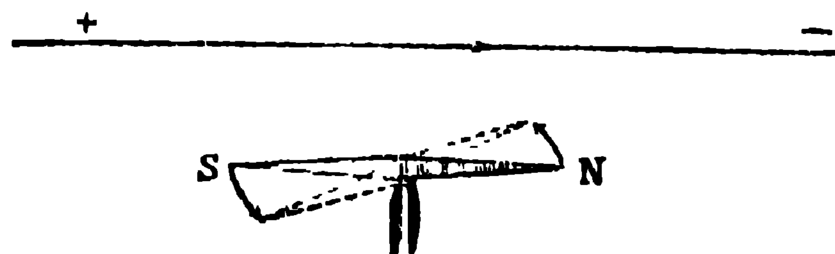


Fig 4.

To get the direction in which the magnet will turn under the action of the rectilinear current + −, suppose a person to place himself facing the magnet in the line of direction of current so that the current passes from his feet to his head. The magnet will turn so that the pole that points north will move to the left. A current in the same direction below will turn the magnet round the opposite way; and a current in the opposite direction the same way. Accordingly, if we bring the circuit right round the magnet, as shown in fig. 5, the effect will be increased. The tangent of the angle through which the magnet turns is directly proportional to the strength of the current; a simple relation which at once suggests an easy method for the measurement of current intensities. By coiling the wire which forms the circuit round several times in succession, each distinct coil being carefully insulated by india-rubber or silk coating from its fellow, the action is rendered more intense.

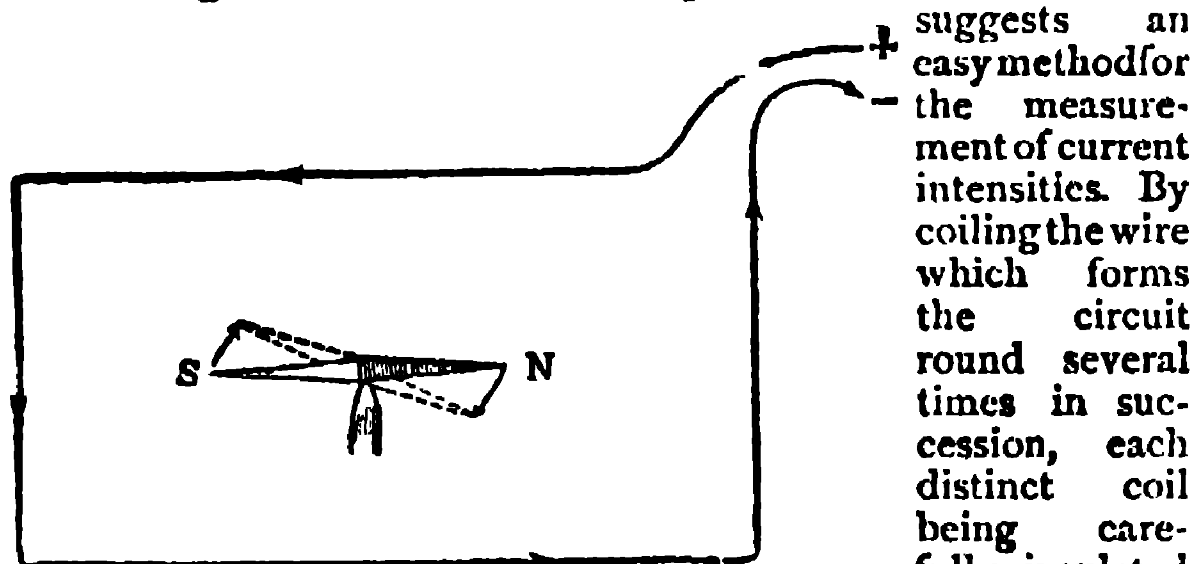


Fig. 5.

Instruments constructed on this principle are called *galvanometers*. The tangent galvanometer is simply a magnet suspended freely in the centre of a multiple coil, over a graduated circle, the numbers on which give at once the tangents of the corresponding angles. The mirror galvanometer is essentially the same instrument, but the magnet is very small, and is fixed to the back of a circular mirror of small mass, which is suspended by a silk fibre in the heart of a compact multiple coil. A beam of light thrown through a small aperture upon the mirror is reflected upon a screen, thus indicating by its position the deflections of the mirror and magnet due to the electric currents through the coil. The distance of the light spot on the screen from the centre or point directly in front of the instrument is really the tangent of *twice* the angle of rotation, for the beam of light is necessarily turned through double the angle which the mirror describes. The differential galvanometer has two independent coils, such that when currents are made to flow in opposite directions they act in opposite directions on the needle, the resultant effect on which may be thus reduced to zero when the currents bear a certain ratio to each other depending upon the resistances in the two circuits. By this means, as mentioned above, resistances of conductors may be compared.

Closely connected with the action of a current upon a magnet are the striking discoveries of Ampère regarding the mutual actions of currents. Let there be a given rectilinear current flowing in a given direction, and let a second current be brought near. If the second current be moving in the same direction as the first, it is attracted; if in the opposite direction, it is repelled. If it flows at right angles to the first and away from it, it is urged in the direction of the first current; and if it flows towards the first current, it is urged in the opposite direction. From his investigations on closed circuits, Ampère established four experimental facts, with the aid of which and one assumption he developed his theory of the mutual action of currents. These data are—(1) The reversal of either current reverses the mutual effect. (2) A sinuous current has the same effect as a straight or continuously curved one from which it nowhere deviates much. (3) A conductor traversed by a current, and movable only in the direction of its length, is not set in motion by a contiguous closed circuit. (4) Equal currents in similar circuits produce equal forces. The one assumption which Ampère made was that the force between two small elements was in the straight line joining their middle points. This assumption cannot be tested experimentally, for it is not possible to form a small current element without at the same time forming a whole circuit. The attractive and repulsive phenomena of currents are very beautifully shown by means of Ampère's *solenoids* of conducting wire, which act in a manner precisely similar to magnets. A solenoid is virtually a helix, but so arranged that the current passed through it has

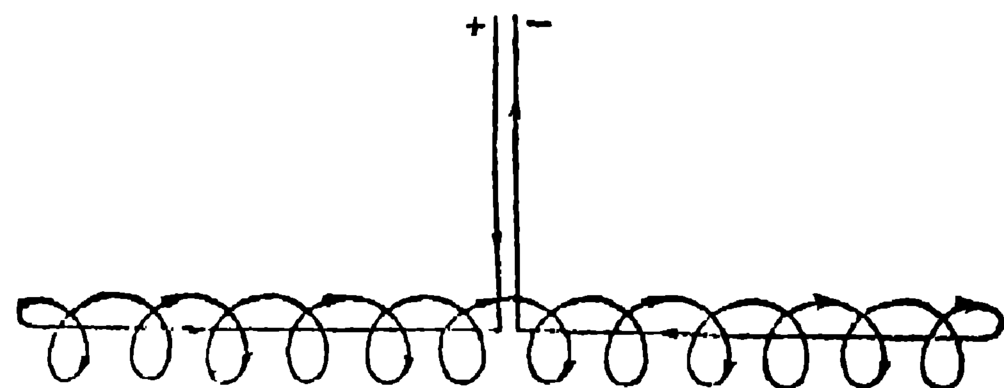


Fig. 6.

no resolved effect *along* the axis of the helix. One simple manner of effecting this is shown in fig. 6, where the current along the rectilinear portions completely neutralises the axially-resolved portion of the current in the helix. Such a system tends, when suspended so as to have freedom of rotatory motion in a horizontal plane, to set itself in the magnetic meridian; and two solenoids show polar attractions and repulsions exactly similar to magnetic phenomena. If a person set himself so as to look directly at one end of a solenoid, the current will appear to be flowing round, say in the positive direction (*i.e.*, opposite to the hands of a watch); if he then similarly regard the other end, the direction of the current will be negative. The former end it is which corresponds to the north pole of a magnet, while the other end acts as a south pole. For convenience we shall call these ends the north and south poles respectively of the solenoid. Let two solenoids (A, B, fig. 7) be placed so that the north pole of A faces the south pole of B. That is, when A is looked at from B, the direction of the current through A is positive; and when B is looked at from A, the direction of the current through B is negative.

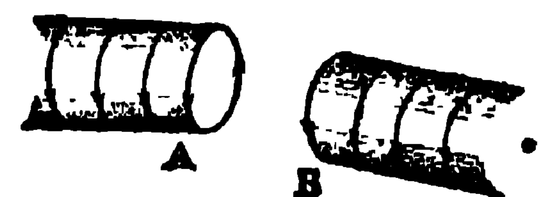


Fig. 7.

A mere inspection of the figure shows that at every point on the terminal circuit of A, the current flows in the same direction as for the corresponding point of B; and consequently, in accordance with the fundamental law of the mutual actions of currents, the solenoids *attract* each other. If two north poles or two south poles had been similarly placed, the solenoids would have been repelled. The special application of these results to the production of *electro-magnets*, and Ampère's ingenious theory of magnetism suggested by these phenomena, are discussed under the article MAGNETISM.

Œrsted's discovery of the motive influence of a current upon a magnet, when taken in connection with the principle of the conservation of energy, has been shown by both Thomson and Helmholtz to lead to Faraday's striking discovery of the *induction* of electric currents in a conductor moving relatively to a magnet. (See MAGNETISM.) The mathematical analysis indicates the existence of a new electro-motive force, that of the induced current, which always acts opposite to that which has set the magnet in motion, and which, being quite independent of the intensity

of the original current, must be produced by the relative motion, even if no such current existed. To the same class of phenomena belongs Arago's discovery of the *damping* effect of a copper plate upon a magnet oscillating over it, in virtue of which the magnet is brought to rest much more rapidly than it would be if no plate were there. The energy of the currents induced on the plate is obtained from the magnet's kinetic energy, which accordingly suffers loss, while the induced currents, in accordance with Œrsted's discovery, react upon the magnet, forcing it round in the direction opposite to that in which it is moving until it come to rest. These isolated cases remained inexplicable, until the genius of Faraday unravelled the mystery, and established a new and most important branch of electro-kinetics.

Let there be two conducting circuits, known respectively as the *primary* and *secondary*. Let the primary be connected with the poles of a voltaic battery, in such a manner that the current may be produced, maintained, stopped, or reversed at pleasure. In the secondary closed circuit let a galvanometer (sufficiently distant from the primary as to be unaffected by it) be introduced, and then set two rectilinear portions of the circuits beside each other. At the instant of *making* the primary current, the galvanometer needle will be deflected—indicating by its direction that there has been produced in the secondary circuit a current flowing in a direction *opposite* to that of the primary current. Maintain the primary current constant, and the needle returns to its normal position—the secondary current has ceased. *Break* the primary circuit, and at that instant the needle is again deflected, but to the other side—indicating a secondary current in the *same* direction as the primary. Every variation in the primary produces electro-motive force in the secondary, generating a current in the same or opposite direction as the primary, according as the intensity of the primary suffers decrease or increase. When there is no variation, there is no electro-motive force. While the primary current is being maintained constant, let it be approached to the secondary circuit. During the approach a secondary current will flow in the *opposite* direction to the primary. If the primary be moved away, there will be a secondary current in the *same* direction as the primary. The same phenomena are observed if the approach and separation be accomplished by the motion of the secondary current. These inductive effects are very closely connected with Ampère's discovery of the mechanical action of currents, as shown by the following law, enunciated by Lenz in 1834:—*If a constant current flows in the primary circuit A, and if, by the motion of A, or of the secondary circuit B, a current is induced in B, the direction of this induced current will be such that, by its electro-magnetic action on A, it tends to oppose the relative motion of the circuits.* This law, established before the modern theory of energy was dreamed of, affords one of the most remarkable confirmations of the conservation principle. The effects of induction by variation of the primary current are increased when the circuits are placed nearer, and the most effective method of arranging the circuits is by forming them into circular or spiral coils, and packing them as close together as possible. The introduction of an iron rod or bundle of wire into the interior of the coils has a powerful intensifying effect upon the secondary current. The current induced at the *making* of the primary current is found from experiment to be exactly equal and opposite to that induced at the *breaking* of the primary. If the primary, then, be made and broken in rapid alternation, as rapid a succession of direct and inverse secondary currents will be produced. The secondary current further is always more intense than the primary, and sparks of considerable brilliancy can be obtained by breaking at any one point the metallic connection in the secondary circuit. Ruhmkorff's *induction coil* affords, in this way, beautiful illustrations of transformation of energy. It consists essentially of two coils, the thicker internal one being the primary, and the thinner but longer external one the secondary. Inside the interior of the inner or primary is a bundle of iron wires, terminated at its extremities by discs of soft iron. When a current is passed through the circuit, the iron core becomes an electro-magnet, attracts a small iron disc which forms the extremity of one arm of a lever, whose other extremity is consequently displaced, and by its displacement breaks the primary circuit. The current accordingly ceases to flow, the soft iron core loses its magnetism, and the lever returns to its original position, thus completing the circuit, and permitting the current anew to flow. The same cycle of operations takes place, and thus an automatic or self-governing arrangement is produced, by which the current can be made and broken in rapid succession. But at each *make* and *break* of the primary, the secondary current, rendered the more intense by the presence of the iron core, is induced, and a rapid series of sparks may be obtained between the terminals. The spark may be varied considerably, as regards its luminous and heating powers, by altering the distance between the terminals, or it may be made to traverse the rarified gas of a Geissler tube, and produce beautiful and striking combinations of stratified and coloured lights. When the current in the coil of an electro-magnet is stopped by breaking the contact between the extremities of two wires held one in each hand, a smart shock will be felt. This Faraday showed to be due to the *induction of the current on itself.* Here the inductive action, due to the cessation of the primary current, is exerted on the same conductor which carries the current, and is more powerful than on a neighbouring conductor because the wire is nearer to itself than any other wire can possibly be. The phenomenon is best observed with the coil of an electro-magnet because of the intensifying effect of the iron core; but it takes place on all occasions when a circuit is broken, for the spark which is seen when a break is made in the circuit is due to the more intense secondary current set in operation at the moment the primary is broken.

It is impossible for one to study these varied electric phenomena, static and kinetic, without in some way striving to get a glimpse of their true nature. What is E.? is a question which has existed from earliest historic times, which has occupied the attention of every electrician, and which yet remains unanswered. The consideration of the various theories that have been mooted will naturally come under notice in a brief historical sketch of the progress of the science. In a most valuable and original treatise on the magnet, published by Dr Gilbert in 1600, we have the first step towards a philosophical combination and generalisation of the phenomena as then known. He showed that electrification can be produced in many other bodies than amber, and is accompanied by the same attractive manifestations in all cases. Boyle, Otto de Guericke, Newton, and other philosophers of that century, contributed several new facts, and the formation of the Royal Society of London roused a somewhat general spirit of inquiry in this direction; but it was not till the present century that the unity which characterises a true science came to be recognised in what had previously been regarded as merely isolated phenomena. As early as 1733, however, the elementary facts of frictional E. were known; for in that year Dufay published his theory of two electric fluids, *vitreous* and *resinous*, which permeate matter, and give rise to all the known phenomena of attraction, repulsion, and induction. Matter which showed no electrification was neutral, because the two fluids were present and mixed in equal quantities. Friction was supposed to produce a separation of the electricities in the rubbed bodies; and when any substance in which the one kind predominated was brought near the unelectrified body, it separated the electricities in it by repelling to the further side its own kind, and attracting to the nearer side the opposite kind. The assumptions necessary for this hypothesis were the existence of two imponderable fluids, each of which should attract the other and repel itself. In 1752 Benjamin Franklin filled a Leyden jar from the clouds, thus proving the identity of lightning and E., originated the names *positive* and *negative*, and enunciated his single-fluid theory. This fluid is imponderable, attracts matter, but is self-repellent. Unelectrified matter contains a certain quantity of this fluid; and friction of two substances has the effect of transferring some of the fluid from the one to the other—thus rendering the one positively and the other negatively electrified. A further assumption, however, has to be made, to the effect that particles of matter which do not contain this fluid in sufficient quantity repel one another. At first sight this would seem a serious objection, for what would become of the law of gravitation? But it must be remembered that gravitation exists between non-electrified bodies, *i.e.*, bodies which contain upon this hypothesis just sufficient fluid to counterbalance by its attraction upon the material particles the repulsion existing between them. Every known phenomenon in frictional E. is explained as simply by the one hypothesis as by the other; and the only scientific objection which can be brought against either is that relating to the necessary assumption of an *imponderable*, incompressible fluid, exhibiting attractive and repulsive properties. The nomenclature suggested by these theories still ir

great part remains, and will always, no doubt, be retained on account of its great convenience. The phrases, transference or passage of E., separation and recombination of the electricities, are continually met with in our modern treatises; but they must not be taken as in any way upholding either of the fluid hypotheses. The great advance made in recent times in electrostatics is the development of the theory of the *potential*. As a mathematical quantity in the theory of attractions it was recognised by Laplace; but its vast importance was only first fully appreciated by George Green in 1828, in his essay *On the Application of Mathematical Analysis to E. and Magnetism*, in which it is called the Potential Function. This essay, long unknown, was only brought to light by Sir W. Thomson, after the more important theorems which it contains had been rediscovered independently by Thomson himself, by Chasles, Sturm, and Gauss. The first-observed phenomenon in contact E. was the peculiar sensation in the tongue, noticed by Sulzer in 1762, when silver and lead were brought into contact with it and each other. In 1791, after careful investigation of the phenomena attending the convulsions of the muscles of a frog when placed in contact with two metals, Galvani laid the foundation of *galvanism* or electrokinetics; and in 1800 Volta published the account of the voltaic pile—a series of discs of zinc and silver, with moistened cardboard between every other pair. Succeeding years were chiefly employed in improving the galvanic battery, till in 1820 Œrsted, by his discovery of the action of a current upon a magnet, laid the foundation of electro-magnetism. Then followed the brilliant researches, experimental and theoretical, of Ampère, which entitle him to the name of the 'Newton of E.' In 1827, Ohm enunciated his law of resistance; and about the same time Faraday began his investigations, establishing the induction of electric currents in a conductor moving relatively to a magnet, in 1831, the laws of electrolytic action, in 1834, and the inductive effects of electric currents, in 1835. These brilliant discoveries have resulted in the invention of magneto-electric machines of every description, and have done more to unite electric phenomena into one grand whole, and to demonstrate the high probability of the greatest of modern generalisations, the conservation of energy, than the life-work of any other investigator; while they more than ever tend to raise the question as to the real nature of E. W. Weber, by a very beautiful but in some points objectionable hypothesis, has deduced all the known laws of electric action, even to the induction of currents. He supposes that the forces exerted on each other by *moving electric particles* differ from those exerted when they are at rest—that is, their mutual potential energy is a function of their relative velocity. At first sight this would seem to be contrary to the conservation principle; but the formula given by Weber satisfies the necessary mathematical criterion for the existence of a potential, and this is all that is required so as to be consistent with the doctrine of energy. When the particles are at rest their relative velocity is zero; and in this case Weber's formula is reduced to the mutual potential energy $\left(\frac{e e'}{r}\right)$ of two quantities of E. By simple differentiation and change of sign, a formula, differing in form but identical in value with Ampère's formula for the force between two current elements, is at once deduced; and the laws of induction are obtained from the same formula by a series of ingenious mathematical transformations. One of the weak points of this theory is the absence of any attempt to explain the propagation of electrical action, or the physical existence of that quantity known as the potential. It assumes action at a distance, without any regard to the medium through which the action takes place. Faraday, in his researches, had always regard to what he called *lines of force* emanating from the conductor in every direction through space. The direction of the line of force passing through a given point represented the direction of the resultant action at that point, so that lines of force are everywhere perpendicular to equipotential surfaces. Thus Faraday looks for the seat of electrical action, not merely in the conductor itself, but also in the surrounding medium. On the same principle, Sir W. Thomson explains the kinetic energy of a current as being not in the matter of the wire itself but in surrounding space, giving rise to a rotatory motion round the lines of force as axes. Professor J. Clerk Maxwell has worked up the conception into a complete theory of electrical action. The medium which transmits light and heat is thrown into a state of motion in the neighbourhood of a magnet, as indicated by the effect of magnetism on polarised light. Now every current is surrounded by lines of magnetic force, so that a certain inertia has to be overcome in starting the current, and a certain momentum must exist in the current when started in virtue of the kinetic energy of the medium. In this inertia and momentum, by the application of Lagrange's dynamical equation to the moving system, Maxwell discovers the known laws of induction and the mechanical action of currents.

The best elementary treatises of E. in the English language are Fleeming Jenkins' *E. and Magnetism* (Longmans, Green, & Co., 3d ed. 1876), and Guthrie's *Magnetism and E.* (Collins, 1876). Faraday's *Experimental Researches* (1855) forms a beautiful example of the growth of the science under the hands of a true experimental philosopher; and the results there given in simple concise language are made the basis of Clerk Maxwell's *E. and Magnetism* (Clarendon Press, 2 vols. 1873), a work of the highest originality in plan and execution and in the analytical methods employed. Thomson's *Papers on Electrostatics and Magnetism* (1872), Thomson and Tait's *Natural Philosophy* (1867), and Tait's *Thermodynamics* (1873), treat of various parts of the science, the last chiefly of its relation to the theory of energy. In French, may be mentioned De La Rive's *Traité d'Électricité* (3 vols. 1854–58), and Deschanel's *Traité Élémentaire de Physique*, translated into English by Professor Everett; in German, Riess' *Reibungselectricität* (1853) and *Abhandlungen* (1867), Beer's *Einleitung in die Electrostatik*, Wiedemann's *Galvanismus und Electromagnetismus* (1872–74), and Wüllner's *Magnetismus und Electricität* (1875). Weber's *Electro-dynamische Massbestimmungen* (1846–52), in which he develops his theory, is full of interest to the mathematician; and the speculative mathematical papers in reference to the transmission of electric action by Riemann, Neumann, and Betti, in Poggendorf's *Annalen*, in the *Mathematische Annalen*, and in the *Nuovo Cimento*, merit notice.

Electricity, Animal. Organised beings, as masses of mere matter, are subject to the laws which determine electrical equilibrium and electrical disturbance. But the physiological changes which occur in the tissues of an animal cause electrical variations. The investigations of these phenomena constitute A. E. Certain fishes have special organs for the development of electricity, by means of which they can communicate a shock to other animals, thus paralysing their prey, or acting in self-defence. These electric fishes are—(1) The torpedo (*Torpedo Galvani*), a species of ray found abundantly in the Mediterranean, occasionally in the Atlantic, and rarely in the North Sea; (2) the *Gymnotus electricus*, an eel-like fish, common in the lakes and rivers of S. America, especially in Guiana; (3) the *Malapterurus electricus*, the raasch or thunder-fish of the Arabs, a native of the Nile and other African rivers; (4) the *Mormyrus longipinnis*, a kind of pike found in the Nile; (5) the *Rhinobatiss electricus*, a ray from Brazil; (6) the *Tetraodon electricus*, a species of globe-fish found in the Nile; (7) the *Gymnarchus electricus*, an eel also found in the Nile; and (8) the *Trichiurus electricus*, a ribbon-like fish found in the Red Sea and Indian Ocean. Some have also asserted that the common skate of the British coasts, *Raia batis*, possesses an electric organ. The electricity generated by these fishes has considerable tension, is capable of developing a spark, of magnetising steel, and of affecting a galvanometer. It would appear that in the structure of these fishes the nerves are always distributed to the positive side of the electrical plate. But in these animals there is always a special apparatus for the evolution of electricity alone. Such arrangements in the animal kingdom are rare, and the electricity produced far exceeds in amount and tension that which may be obtained from any living tissue, such as muscle, by means of a delicate galvanometer. The present state of our knowledge of A. E. will be best understood by a slight sketch of the rise and progress of this department of science. The discovery of A. E. dates from 1786, when Galvani, who was then Professor of Anatomy and Physiology in Bologna, had his attention directed to the convulsions produced in frogs' legs by the working of an electrical machine in their vicinity. Recognising the fact that the skinned hind-limbs of a frog may be used as a delicate electroscope, he attempted, on 20th September 1786, to employ them in experiments on atmospheric electricity. He suspended a number of frog's legs to the iron trellis-work surrounding the balcony of his house, by means of copper hooks, and saw, when the legs were blown about by

the wind so as to cause them now and again to touch the iron, that they were convulsed. After many experiments he concluded that the convulsions were not due to electricity from the atmosphere, but to an inherent A. E. This discovery, announced by Galvani as that of a nervous fluid which, if not life itself, was something akin to it, soon attracted great attention, and wild speculations were put forth, in which it was asserted that the entire source of life was attributable to this new principle, which, in honour of its discoverer, was called *galvanism*. In 1791 Alexander Volta, Professor of Natural History in the University of Pavia, repeated Galvani's experiments, and devised numerous others, the result of which was that he asserted that the contractions in the frogs' legs were not due to an inherent A. E., as Galvani had supposed, but to the action of the juices of the frog's limb on the metals with which it was connected. These investigations led to the discovery of the production of electricity by the contact of dissimilar metals, to the invention of the well-known *voltaic pile*, and to *voltaic* (often termed *galvanic*) *electricity*, to which the world is so much indebted. Volta's experimental criticism and denial of Galvani's fundamental position led to a bitter controversy, in which most of the scientific men of the time took part. Galvani, aided by his nephew Aldini, showed that under special circumstances muscular contractions might be obtained without the aid of any metal at all, by simply allowing the sciatic nerve of an insulated frog's leg to drop on the muscles and come into contact with them externally. This experiment Volta and his followers objected to on the ground that the contact of such dissimilar substances as muscle and nerve, aided by a little blood or serum, was quite sufficient to produce the electrical current which caused the muscles of the leg to contract. The discovery of the voltaic pile, and the great practical consequences flowing from it, caused the world to forget for a time the subject of A. E. For twenty-eight years after the death of Galvani, which happened in 1798, little was heard of the matter, and *animal magnetism*, as it was called, was held in contempt. But in 1826 Nobili, by means of a delicate galvanometer, demonstrated the existence of an electrical current in the frog, which he stated passed from the feet to the head of the animal. Nobili attributed the current thus obtained to Thermo-Electricity (q. v.), an opinion which has since been proved to be erroneous. In 1837 Matteucci, then Professor of Physiology in Pisa, obtained a current in a similar way, and made the important announcement that 'the interior of a muscle, placed in connection with any part whatever of the same animal, such as nerve, surface of skin, or surface of muscle, produces a current which goes in the animal from the muscular part to that which is not so.' He further worked out many of the details of the subject, and must be regarded as the founder of all our modern views. In 1841 Emil du-Bois-Reymond, the present distinguished professor of physiology in the University of Berlin, repeated Matteucci's experiments and further investigated the subject with the aid of most delicate galvanometers, and other ingenious apparatus specially contrived for the kind of work. He was at length able to announce the law of the muscular current, as at present understood, viz., 'Any point of the natural or artificial longitudinal section of a muscle is positive in relation to any point of the natural or artificial transverse section.' Thus it may be stated in general terms that the surface of a muscle is always positive to its transverse section, so that when one terminal (*A*) of a galvanometer is connected with the longitudinal section or with the surface, and the other terminal is connected with the transverse section (*B*), a current flows through the coils of the galvanometer from *A* to *B*. The same is true of nerve. Du-Bois-Reymond also showed that there is no current peculiar to the frog, as Matteucci supposed. Currents may also be obtained from the human being by placing both hands or other parts of the body, with special contrivances, in connection with the terminals of a galvanometer. It may be stated generally that all living textures, when connected with a galvanometer sufficiently delicate, indicate the existence of electrical currents, and that these electrical currents are diminished in amount when the tissue, such as muscle or nerve, is in a state of action. When a muscle contracts, for example, the electrical current is diminished. This diminution of the natural current during action is called the *negative variation of the muscle current*. The same is true as regards nerve. It is fair to mention that Professor Hermann of Zurich, almost alone among physiologists, denies the existence of any inherent current in animal tissues, and he attributes all the phenomena observed to death of part of the muscular or nervous structure exposed, leading by chemical changes to differences of potential, and consequently to a current. For details regarding A. E., see Morgan's *Electro-Physiology*.

Electricity, Medical. Electricity has been employed as a curative agent from very remote times. Paracelsus ascribed curative power to the loadstone; but it was not till 1748 that Jallabert applied the electrical machine to the cure of paralysis. Franklin used it for the same purpose. Cavallo in 1780, Poma and Arnaud in 1787, employed it in paralysis, chronic rheumatism, chorea, epilepsy, &c. In 1789 Galvani made the discovery which immortalised his name, and the new voltaic and galvanic instruments superseded the electrical machines. The discovery of induced galvanic electricity by Faraday, and the invention of the rotary magneto-electric apparatus of Pixii in 1832, formed the next great advance in electro-therapeutics. The varieties of electricity depend upon its mode of development, which may be by friction or mechanical action, by contact or chemical action, or by induction from these sources or from magnetism. Frictional electricity, generated by the machine, is of a low degree of intensity, but is produced in large quantity and of great decomposing energy. It is still employed as a stimulant to sensory nerves, as a counter-irritant, a sudorific, and in the treatment of amenorrhœa, paralysis, &c., and for such purposes it is applied as the bath, the aura, the spark, and the shock. Galvanic or voltaic electricity is developed by the contact and chemical action of dissimilar substances. Galvanism applied to the skin excites more or less inflammatory action, accompanied with a sense of burning, the sensation varying from a slight tingling to an almost intolerable pain, and, if maintained for a sufficient length of time, it may produce ulceration and destruction of the skin and subjacent structures. It increases and diminishes sensibility and muscular irritability, is a tonic, and increases nutrition; it stimulates the secretions and the circulation, coagulates blood, increases the activity of the lymphatics and glands, promotes the absorption of exudations, and dispersion of tumours. These effects are best marked when the constant current is used; but when the current is intermittent the contractile effects on the muscles are very much increased. The continuous gentle action of small, single, and compound voltaic apparatus has been employed successfully in paralysis, amaurosis, neuralgia, &c., by application to the surface of the body over the parts affected, or by needles thrust into them (galvano-puncture). By galvano-puncture aneurism has been cured by the coagulation of the contents of the sac; attempts have been made to dissolve calculi in the bladder; and surgical cauterisation of otherwise inaccessible parts has been successfully performed. The apparatus employed for the production of interrupted or induced currents are the magneto-electric and the electro-magnetic coil machines. The former consists of a bar of iron (round which thin iron wire is coiled), and a horse-shoe magnet. Electricity is evolved by the iron bar being maintained in a constant whirling motion before the poles of the magnet. The machine is not self-acting, and its currents pass in opposite directions. The electro-magnetic machine has the advantage of being self-acting; but the objection to it is that it requires a battery to keep it in action, and, of course, the use of acids. By recent improvements, however, since the introduction of the carbon electro-negative, and the solution of the bisulphate of mercury, it can be made portable, and also effective. The electro-magnetic machine has now almost entirely superseded other electric machines in therapeutics, more especially since the publication of the work of M. Duchenne (of Boulogne), with whom it was a favourite instrument. Our limits do not permit of a detailed description of the apparatus. Electricity is administered by including a portion of the body between the two excitors or electrodes, thus causing it to form a part of the established circuit. Much of the results of electricity is due to the kind and quality of the current used, the method of application, and the direction of the current. When it traverses from the centre to the periphery, it is termed the direct or descending current, and when from the periphery to the centre, the inverse or ascending current. A descending current may be made to pass to or from a painful spot; in the former case, if the negative pole be placed over it, and in the latter, if covered by the positive. In the first case there is increased action at the point of treatment, and in the latter diminished action. Different opinions prevail regarding the directions

in which the currents should run in their therapeutical employment. The beneficial effects of electricity in the treatment of many diseases are firmly established. The best works on the subject are by M. Duchenne, and Dr Althaus's *Treatise on M. E.*, (Lond. Longmans, 1876).

Electric Light. When the terminals of a very powerful battery are connected and then slightly separated, the electric current may be made to pass through the air, producing a very intense heat and brilliant light. This light is best shown between two carbon points, each connected with one pole of the battery, and capable of adjustment by means of mechanical apparatus. Instead of the battery, a magneto-electric machine might be advantageously employed, if the expense of the driving of such could be reduced to a reasonable limit. The apparatus contrived by Duboscq is specially designed to obviate the inconvenience arising from the rapid wasting away of the carbon points. The points are kept at the necessary distance by clockwork, which is itself so regulated by the distance separating the points that when they are too close, its action is retarded and when too far distant, its action is accelerated. The E. L. gives a continuous spectrum, and accordingly it is extremely useful in investigating the spectroscopic properties of any given substance. (See SPECTRUM ANALYSIS.) The E. L. has been successfully employed in the lighting of lighthouses, and by the French in the illumination of railway stations. In the new opera-house at Paris electricity is employed on a very large scale, both for ordinary illuminating purposes and for scenic effects.

Electric Telegraph. See TELEGRAPH.

Electro-Chemical Order of the Elements. When two metals properly insulated are brought in contact and then separated, it is found that the one is charged with negative, the other with positive electricity. Thus if zinc and iron be taken, the zinc is found to be positively electrified, the iron negatively. With iron and platinum, however, the iron receives a charge of positive electricity, the platinum of negative. Thus iron is said to be negative to zinc, positive to platinum. The metals may be so arranged that each is electro-positive to the one succeeding and electro-negative to the one preceding it: thus, zinc, tin, iron, lead, copper, silver, gold, platinum. These metals replace one another in their solutions in the above order. Thus if zinc be placed in a solution of chloride of tin, tin is deposited, zinc dissolved. If copper be placed in a solution of nitrate of silver, silver is deposited, copper dissolved, &c. The order of the above metals is also that of their affinity for oxygen, zinc having the strongest affinity for oxygen, platinum the least. Oxygen therefore may be said to be the most electro-negative element, and comes as the first of the list. The affinity of oxygen for the other elements may be used for ascertaining their position in the electro-chemical series, and a complete list may thus be drawn up.

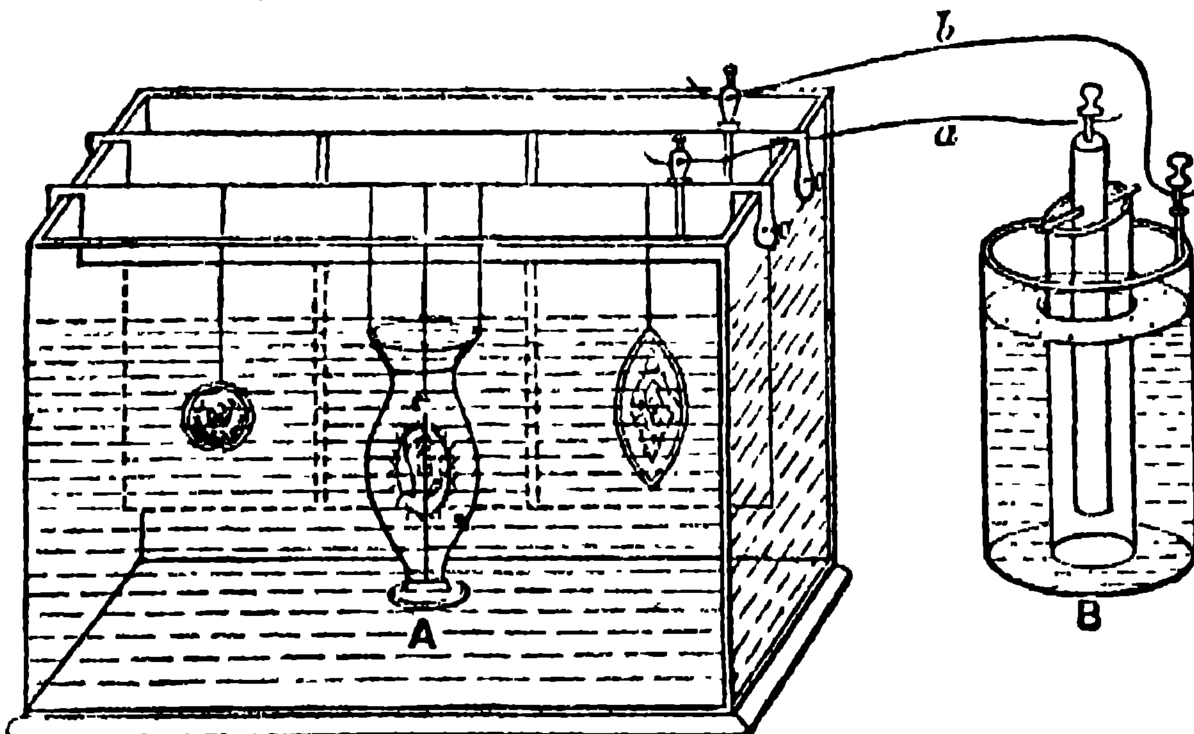
Electrol'ysis is the decomposition of a chemically compound substance by means of an electric current. If two pieces of platinum, connected with the poles of a voltaic battery, are immersed in a quantity of slightly-acidulated water, and if, at the same time, the electromotive force of the battery be sufficiently strong, an electric current will pass and decompose the water into its constituent parts, hydrogen being given off from the platinum connected with the negative pole, and oxygen from the platinum connected with the positive pole. The liquid so decomposed is termed the electrolyte; and the platinum or other metal surfaces by which the current enters and leaves, the electrodes. The electrode by which the current enters is called the anode, and the electrode by which the current leaves the kathode. The products of the decomposition are known as the Ions—the Anion appearing at the anode, the kation at the kathode. These names were invented by Faraday with the aid of Whewell, and are now in general use. The fundamental law of E., as established by Faraday and confirmed by Beetz, Hittorf, and others, is that the quantity of electrolyte decomposed in a given time is proportional to the strength of the current; and the same current decomposes chemically equivalent quantities of different electrolytes in the same time. In many cases of electrolytic action, the actual ions are not given off, but instead substances formed by the chemical action of the ions upon the electrolyte. For instance, the products of the decomposition of a solution of sodic sulphate are oxygen and hydrogen at the anode and kathode respectively—exactly the decomposition in the case of acidulated water or dilute sulphuric acid. Careful experimental examination of the phenomenon shows that at the anode there is sulphuric acid as well as oxygen, and at the kathode caustic soda as well as hydrogen. The nature of the action seems to be that Na_2SO_4 splits up into sodium (Na_2) and the acid radical (SO_4). These act chemically upon the water of the solution, the reactions being $Na_2 + 2H_2O = 2\ NaHO + H_2$ and $SO_4 + H_2O = H_2SO_4 + O$. That this is the true action is indicated by the E. of similar electrolytes, such as sulphate of copper, in which the copper appears as a metallic deposit at the anode. (See ELECTRO-METALLURGY.) It is questionable whether pure water is really an electrolyte; for the purer it is the greater resistance does it present to the passage of a current. The action may be the decomposition of the sulphuric acid, which is required to be present in small quantity to render the E. possible. If the electrodes, after E. has been going on for some time, be disconnected from the battery poles, and joined to the terminals of the coil of a delicate galvanometer, a current will be evident—flowing in the direction opposite to that which produced the E., but soon disappearing. This is due to what is known as the *polarisation of the electrodes*, in virtue of which their potentials are rendered different, and the existence of an electro-motive force made possible. No polarisation takes place when the electrodes are formed of the metal which enters as one of the chemical constituents of the electrolyte. Thus zinc electrodes in sulphate of zinc do not become polarised. It is this polarisation that renders the measurement of the electric resistance of electrolytes so difficult. It seems, however, that Ohm's law of the relation between resistance and length of current holds for electrolytes as well as for metallic conductors; but that, unlike metallic conductors, electrolytes have their resistance diminished with increase of temperature. Experiments have also been made by various physicists to investigate the change of resistance due to change of density of the solution of a given electrolyte. Beetz, Kohlrausch and Nippoldt, and Paalzow investigated this subject in different ways, endeavouring by more or less ingenious devices to eliminate the error due to polarisation. The most recent experiments are those of Messrs Ewing and MacGregor, published in the *Transactions of the Royal Society of Edinburgh* (1873), in which much interesting information, historical and otherwise, will be found. See also Jenkins' *Electricity and Magnetism*.

The phenomena of E. are not yet fully explained, and cannot be till a more exact knowledge of the molecular constitution of bodies is obtained. According to Clausius, dissociation is constantly going on in a compound liquid—that is, the compound molecules, which are constantly changing their relative positions, become broken up into their component molecules on account of the continually occurring collisions, so that each individual atom may be supposed to be continually changing its partner from time to time. This process Clausius supposes to go on always, and indifferently in all directions; but when a current is passed through the liquid the molecules become influenced by the electro-motive force, so that each molecule of the kation struggles towards the kathode, pairing for a time with each molecule of the anion which it meets struggling in the opposite direction towards the anode. Accordingly at the electrodes free ions collect, and these are charged, each kation positively and each anion negatively. Upon this theory polarisation is due to the collection of positively-charged ions at the negative electrode, whose potential is thus raised, and an electro-motive force contrary to the electrolysing current generated. Now the ions deposited on the electrodes tend to become free, escaping as gas, diffusing through the liquid, or precipitating as a solid, so that here we have the explanation of the dissipation of polarisation. This theory further shows how only liquids can act as electrolytes, the molecular conditions necessary for the process not existing in solids and gases; but it cannot fully explain why compound liquids are not *all* electrolytes. For minuter details of this theory, see Clausius' article in Poggendorf's *Annalen* for 1857, Maxwell's *Electricity and Magnetism* (vol. i.), or Maxwell's *Heat*.

Electro-Metallurgy is the art of depositing or precipitating in a metallic state various metals or alloys from their solutions by means of electrical currents. It is one of the most useful of all the applications of electricity, and since its discovery, within comparatively recent years, it has been applied to innumerable useful and important metallurgical operations, and has

indeed revolutionised many processes. The history of the discovery is inseparably bound up with the gradual development of knowledge and experience in electricity, so that it is difficult to apportion the honour of first discoverers among the numerous claimants to that distinction. Professor Jacobi of St Petersburg announced in 1839 that he had discovered a means of 'converting any line, however fine, engraved on copper, into a relief by galvanic process.' In the same year Mr Spencer of Liverpool communicated an elaborate paper to the British Association on working in metals by voltaic electricity, in which he gave details of numerous experiments performed by him, commencing in September 1837. Mr Spencer successfully obtained by electro-deposit of copper, impressions from engraved plates, facsimiles of medals, and stereotype plates. Mr C. J. Jordan also claimed that he had successfully conducted similar experiments previous to the announcement of Jacobi's investigations. From 1839 dates the practical working of metallurgical operations by electro-deposit, and, as usual, a host of patents were applied for and obtained, each claiming some new process or application, the deposition of particular metals, special forms of batteries, or new solvents for the metals to be deposited. The most successful of the patentees from a commercial point were Messrs George R. and Henry Elkington, who, in March 1840, secured a patent for 'coating, covering, or plating metals' with gold and silver. The patent of Messrs Elkington was the foundation of the now enormous industry in electro-plate carried on in Birmingham and Sheffield, as well as at many foreign centres. The firm of Elkington & Co. to the present day continues to occupy the foremost place in the development and extension of the art which its founders created.

The practical operations of E.-M. as conducted at the present day may be divided into (1) electro-depositing, in which any metal—as, for example, copper—is precipitated on a mould and so formed into the substantial ground of any article useful or ornamental; and (2) electroplating, or the coating of any metal with



Electric Battery.

a different metal or alloy. The processes by which the metals in both cases are deposited are quite the same, but in the one case a mould is placed in the plating-vat, while in the other it is the article to be plated or covered which is so treated. In the preparation of electrotype copies of art metal-work, which constitutes one important branch of E.-M., both processes are usually employed; the body of the article, a jug or vase for example, being deposited in copper on a mould, and subsequently electroplated with silver or gold. The deposition of metals from solutions of their salts is due to the electrolytic action of the current (see ELECTROLYSIS), in virtue of which the electrolyte is decomposed, and the metallic component appears at the negative electrode. The moulds having been prepared, they are placed in a trough or vat (A) filled with an acid solution of blue vitriol (sulphate of copper), and opposite the moulds are suspended plates of metallic copper. A wire (*a*) passes from the metal rod on which the mould is hung to the zinc pole of a Daniell's cell (B), that being the battery originally employed, though now generally superseded; and the circuit is completed by connecting the rod from which the plates of metal depend with the copper of the battery cell by another wire (*b*). As the action proceeds, copper is by slow degrees reduced from the solution and deposited on the prepared moulds, the amount so taken up being replaced by a similar quantity dissolved from the plates of copper. The process of deposition may go on till any desired thickness of copper is attained, and neither is there any limit to the size of the object deposited. The objects when taken from the bath are treated like ordinary castings; and to many of them, in common with nickel-silver and Britannia-metal articles, the process of electroplating, or coating with silver (and sometimes gold), is next applied. In the early years of plating the expense of the process prevented works of great size from being undertaken by E.-M. as each pound of copper deposited required the expenditure of 1 lb. of zinc and 1½ lbs. of sulphuric acid. Now in all large works the Daniell battery is superseded by Wilde's or Gramme's magneto-electric engine which deposits at less than one-tenth the cost of galvanic electricity, and works of large dimensions, such as full-size statues, are produced by electro-deposit. Besides such works and reproductions of art manufactures, electro-deposit is very extensively employed for copying wood-engravings and for preparing electrotypes for printing, as well as in cheap jewellery and button-making, and a great variety of minor metallurgical operations.

Electroplating.—This operation is most largely employed for preparing imitations of silver plate for table use, the basis of the best quality of which is nickel or German silver, while for an inferior class of wares the Britannia metal is used. When Britannia metal is to be plated, it has first to receive a thin coating of copper, as silver or gold will not adhere to that particular alloy. The articles to be plated are first 'buffed,' or smoothed on leather to give them a proper surface to receive the coating of precious metal. They are then successively dipped in an alkaline solution, a weak acid, and in pure water, after which cleaning they are plunged in a solution of cyanide of mercury to prevent any oxidation taking place. The articles are now ready to be placed in the silvering vat (if silver is to be deposited), which contains a solution of cyanide of silver, and in which plates of silver also are hung. When the silvering is complete the plated goods are washed and brushed with a metallic wire brush. Electro-gilding is conducted on an analogous principle, the bath being prepared with chloride of gold, cyanide of potassium, and carbonate of potash.

A great number of metals in addition to those mentioned can be deposited by electricity, and even an electro-deposit of brass is obtained in practice. The deposit of nickel has also been conducted on a commercial scale; and especially in America that metal is now very extensively employed for plating iron objects, fittings of harness, door and other knobs, hat-pegs, and many similar objects. Tin has also recently been deposited by electricity, and the separation of tin and iron in old tin plate is largely accomplished by similar means. See Gore's *Art of E.-M.* (1877).

Electrostat'ic In'struments are of three kinds—(1) those which produce, (2) those which accumulate, and (3) those which measure given charges of electricity. To the first kind belongs the common frictional machine, in which a glass wheel or cylinder is made to revolve and rub against a leather surface coated with an amalgam of zinc and mercury. Each portion of the glass surface as it moves away becomes positively electrified, and upon coming opposite a set of sharp metal points in connection with an insulated conductor, known as the *prime conductor* of the machine, induces in them a negative charge. If the machine is in working order a discharge takes place through the air between the glass and the points, and the glass loses a portion of its electricity, which is transferred to the prime conductor. To make a continuous production possible the negative electricity on the coated leather surface must also be removed, and this is effected by connecting it, directly or through the agency of its prime conductor, with the earth. The first machine of this kind was Otto de Guericke's rotating globe of sulphur, which was electrified by friction with the hand. In Sir W. Armstrong's *hydro-electric* machine, the electricity is produced by the friction of the minute drops of water upon the walls of the apertures through which steam is sharply driven at considerable pressure. Volta's *electrophorus* consists of two equal-sized plates, the one of ebonite or resin backed with metal, the other of metal. The former has a metallic pin which, when the plates are in contact, connects the metal plate with the metallic back of the ebonite plate. The ebonite plate is first negatively electrified by rubbing it with cat-skin, and then brought near the metal plate, whose potential is thus rendered

negative by induction. When they are sufficiently near, a spark passes between the metal plate and metallic pin, and upon the separation of the discs the metal is found to be positively electrified. Since the ebonite long retains its electrification, especially if the air is dry, this process may be repeated again and again, and a conductor fully charged by successive additions. The energy of the electrification has its equivalent in the excess of work spent during the separation over the work done by the electrical forces during the approach of the plates. The induction machine of Holtz is on the same principle. It consists of two parallel concentric glass wheels, one fixed, the other capable of rapid rotation. Near the exterior surface, and at opposite sides of the rotating wheel, are placed two metallic combs, each connected with an insulated conductor. On the fixed wheel two pieces of pasteboard are fastened facing the combs. One of these is electrified negatively by contact with a rubbed piece of vulcanite, and acts inductively through the discs on the comb opposite, which discharges electricity on the surface of the revolving disc, becoming itself negatively charged, as does the second comb, with which it is connected meanwhile. When the positively charged portion of the disc comes opposite the second comb, discharge takes place between them; and after a few turns the positive electricity on the glass disc exceeds the negative on the comb, so that the discharge is followed by the positive electrification of the conductor of this comb. Brilliant and long-continued sparks are produced on breaking the connection of the conductors.

Of electric accumulators the most important is the Leyden jar, so named from Leyden, where its accumulating power was first observed and investigated by Kleist, Cuneus, and Muschenbroeck about the year 1746. It consists usually of a cylindrical glass jar, coated internally and externally with tinfoil, and having a metallic rod in connection with the interior coating, rising a few inches above the top of the jar and terminated by a brass knob. The jar is charged by collecting electricity from the prime conductor of a machine by means of this knob; while the external layer is kept at zero potential by being put in connection with the earth. (See ELECTRICITY.) An *electric battery* consists of a number of charged Leyden jars, with their external surfaces connected, as also their internal surfaces, by means of metallic rods joining the knobs. It is necessarily very dangerous to handle, and is only employed in experiments which require large charges.

The first instrument which was used to *measure* forces due to charges, and therefore charges, of electricity, and the first instrument accordingly which deserved the name of *electrometer*, was Coulomb's torsion balance. Formerly, however, before electrometers had reached their present development and importance, the name was given to what were nothing more than *electroscopes*, or instruments for *showing* the presence and nature of electrification. The best-known of these is the so-called *gold-leaf* electroscope, which consists of an insulated vertical metallic rod, with a knob or disc at its upper and two gold leaves suspended from its lower extremity. The gold leaves are free to move, and of course show repulsion when the rod becomes electrified either by induction from, or contact with, a charged conductor. Electrometers for the direct measurement of differences of potential, between two conductors, have been of recent years carried to a high degree of perfection, both in theory and construction, especially by Sir William Thomson of Glasgow. His absolute electrometer is an improved form of the attracted-disc electrometer of Sir W. Snow Harris. The principle is that when two small discs at different potentials are placed face to face, with a small space between them, the electrification will be nearly uniform on the opposed faces, if no other conductor be near. One of Thomson's chief improvements is the addition of the *guard-ring*, which does away with much of the disturbing effect of the case containing the disc. The instrument, thus improved, consists essentially of two parallel plates at different potentials, one of which is divided into two portions, a central circular and movable portion, and an outer immovable ring, which is the so-called guard-ring. No part of this movable portion is accordingly near the edge, and its electrification is practically uniform. The lower surface of the guard-ring is plane and parallel to the upper opposed surface of the other disc. The movable disc, which just fills the aperture of the guard-ring, is suspended from an arm of a delicate balance, and is adjusted by means of a weight on its upper surface so as to have its lower surface in the same plane as the lower surface of the guard-ring. If the potentials of two conductors are to be compared, they are placed in connection each with one of the discs. The weight on the suspended disc is then removed, and the lower disc screwed up until its attraction brings the suspended disc down to exactly its original position. The attractive force between the discs must then be equal to the weight removed, and is therefore known as well as the distance between the discs, so that the difference of potential is at once determinable. The necessity of adjusting the lower disc for each observation is an inconvenience, which, however, does not exist in electrometers of the *divided-ring* construction. The extremely delicate and refined quadrant electrometer of Sir W. Thomson is constructed after this method, the principle of which will be evident from the following short description. A cylindrical conducting box is divided into four quadrants, separately insulated. The opposite quadrants are united, thus forming two pairs, each pair being kept at the same potential throughout. The one pair (A) is usually connected with the earth, and the other (B) with the body whose potential is to be measured. There is another conductor (C) suspended close below the quadrants so as to have free azimuthal motion round a vertical line, which coincides with the axis of the cylindrically-arranged quadrants. This conductor is kept at a high potential by being connected with the inner coating of a Leyden jar which forms the lower portion of the instrument. If the potential of B be of the same sign as that of C, C will tend to move from B to A with a nearly uniform force, which will be ultimately equilibrated by the torsion of the suspension apparatus. Within certain limits the deflexions are connected with the potentials by a simple formula. See Thomson's *Papers on Electrostatics and Magnetism*, and Maxwell's and Jenkin's treatises on *Electricity and Magnetism*.

Electroto'nus, in Physiology, is the condition into which a living nerve passes while it is traversed by a continuous electrical current. While in this condition its properties are changed, so that in the neighbourhood of the positive pole its irritability and rate of conductivity are diminished, and its power of producing a current of electricity is increased, while in the neighbourhood of the negative pole the reverse is the case. The part near the positive pole is said to be in an *anelectrotonic*, and that near the negative pole in a *cathelectrotonic* state. See NERVE.

Elec'tuary, a medicinal preparation in which the active ingredients are incorporated with some conserve, such as honey, molasses, or syrup. Such medicines are usually insoluble and of large bulk, as sulphur. They are frequently called *conserves*. *E. lénitif* is almost identical with *E. sennæ comp.*

Ele'git is an English law-term denoting a writ of execution directed to the sheriff, commanding him to take in execution but not to sell the lands and goods of a debtor. These the creditor holds until he gets satisfaction for his debt, during which time he is *tenant by E.* See ADJUDICATION.

El'egy (Gr. *elegos*, from *e e* and *legein*, 'to cry woe') radically signifies a lament without reference to metrical form. Among the Greeks the word was early applied to a poem written in distichs of alternate hexameters and pentameters, and devoted either to the praise of valour, as in Callinus and Tyrtæus, or to the inculcation of moral precepts, as in Solon and Theognis. This measure soon came to be regarded as the fittest vehicle for sustained emotions and tender sentiments, and with Simonides and Mimnermus the sad E. attained the highest excellence. Catullus and Gallus were the first successful writers of Roman E., which reached its highest perfection in the tender Tibullus, the brilliant Propertius, and the sensuous Ovid. The term E. may now be applied to any serious piece pervaded by a melancholy tinge, without regard to the measure. The quatrain of Gray's *Elegy*, however, has come to be regarded as the representative form in English, and as, on the whole, the best fitted for mournful themes.

Elegy, in music, a name occasionally given to a composition expressing the same ideas as the poetic E.

Elemen'tal Spirits were, in mediæval superstition, the spirits of the elements fire, air, earth, and water, and were named respectively salamanders, sylphs, gnomes, and nymphs or undines. The gnomes, spirits of the earth and the underworld, were mischievous and malevolent in their relations to human beings;

while the sylphs, the spirits of the air, were a species of benevolent fairies. The literary 'machinery' supplied by these fanciful creatures, personified types of the powers of the elements in which they have birth and life, has been employed with excellent effect by modern writers. The conduct of the story of Pope's *Rape of the Lock* is managed chiefly by sylphs—

'The light militia of the lower sky.'

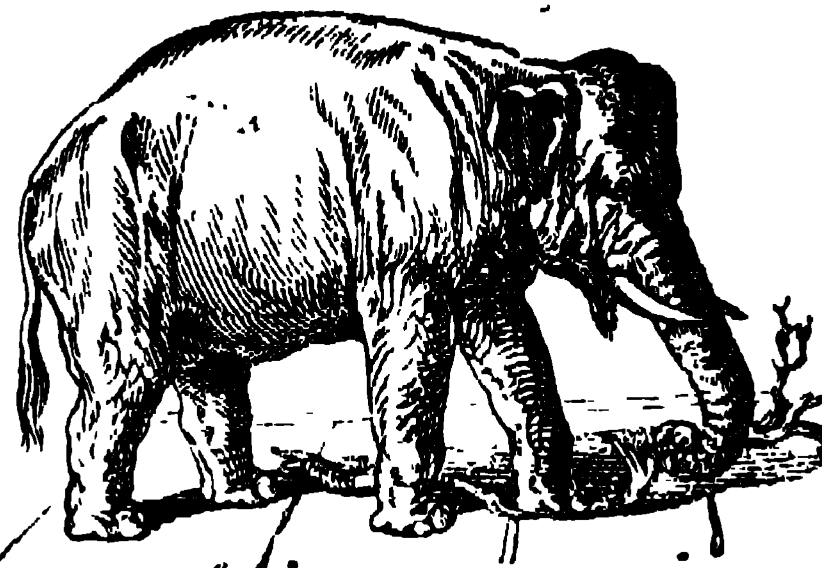
Baron Fouqué is indebted to the E. S. of water for his beautiful *Undine;* while in the graceful tales of Lessing and Tieck the creatures of the elements are invested with the rarest beauty, and are described with much suggestive meaning.

El'ements, in astronomy, are the numerical quantities necessary for computing the place of a planet or satellite in the heavens. The major-axis and eccentricity fix the size of the elliptic orbit; but besides these we must also know the inclination of the orbit to the ecliptic, the longitude of the ascending node, the longitude of the perihelion, and the time of its perihelion passage. The longitudes are measured from the line of equinoxes. The dimensions and masses of the bodies themselves are also tabulated as E. See Herschel's *Outlines*.

Elements, Chemical. All researches into the composition of matter have shown that it consists essentially of two kinds—that which is capable of decomposition or resolution into two or more distinct substances, and that which is capable of no such change. To the first of these kinds the name of compounds has been given, to the second that of elements. All compounds are formed of the elements, the nature of the compound depending not alone upon the elements which it contains, but also upon the proportions in which these are present. Numerous as the compounds are, they yet contain comparatively few elements, science up to the present time having revealed the existence of but sixty-four of the latter, if the new metal gallium be included in the list. The elements vary in their appearance, physical state (under ordinary conditions), and in their properties. They are divided into two groups,—the metals and the nonmetals. Of the former all are solid at ordinary temperatures, with the exception of mercury or quicksilver, which is liquid. They are all opaque, and for the most part exhibit the peculiar appearance termed metallic lustre. They are, as a rule, good conductors both of heat and electricity. Many are soft, such as lead, copper, silver, iron, &c., either at ordinary temperatures or when heated, and these can be rolled and hammered into various shapes, and drawn into wire. Others, however, are brittle under all conditions, such as cobalt, titanium, &c., and as a consequence are neither malleable nor ductile. The distinguishing chemical character of a metal is that it forms at least one compound with oxygen which is a base, *i.e.*, a substance capable of combining with an acid to form a salt. Of the non-metals three are gaseous under all conditions, viz., hydrogen, oxygen, and nitrogen, one gaseous under ordinary conditions, but capable of condensation to a liquid when submitted to extreme pressure and intense cold, viz., chlorine. Bromine is the only liquid non-metal at ordinary temperatures; the remainder are solid. Many of the non-metals are transparent, others opaque; some are opaque in one condition, transparent in another. Carbon, for instance, is opaque in graphite and charcoal, transparent in the diamond. Metallic lustre is not a special character of the metals; it is possessed by several of the non-metals. Thus graphite, tellurium, and selenium, as far as their appearance goes, might readily be mistaken for metals. The non-metals are generally bad conductors of heat and electricity. None can be said to be ductile or malleable. All combine with oxygen (with the exception of fluorine) to form at least one acid oxide.

El'emi, a fragrant and resinous substance, obtained from plants (*Amyris hexandra* and *Amyris Plumieri*) belonging to the natural order *Amyridaceæ*, or 'Myrrh order.' E. was formerly obtained from Egypt, but is now chiefly brought from Manilla and America. It is obtained from the *Icica Icicariba* of Brazil. E. consists of the juice of the trees, which exudes from punctures made in the bark. It is used in making ointments and plasters. It contains a volatile oil, and is soluble in alcohol.

El'ephant (Gr. *elephas*), the name given to two species of large mammalia, regarded in modern zoology as included in a special order of Placental or higher mammals, named *Proboscidea*. The characters of this order are found firstly in the elongation of the nose to form a sensitive, highly muscular, prehensile proboscis or trunk; secondly, in the absence of canine teeth, and in the growth of the incisors to form tusks, the molar teeth being few in number; thirdly, in the feet being provided each with five toes, which are not fully indicated or completely divided from the foot externally, whilst the feet are padded with a thick skin; fourthly, in the absence of clavicles; and fifthly, in the testes being retained throughout life within the abdomen, and never descending into a scrotum, whilst there are only two teats on the chest, and the Placenta (q. v.) is deciduate, and is of zonary form. Included in this order, besides the two species of living forms, are various extinct forms (mammoth, mastodon, &c.), which receive special articles, and are also referred to in treating of the palæontology of the present group. With the general form of the E. all are familiar. The skin is almost destitute of hairs, and presents a hard tanned-looking surface. Notwithstanding the apparent impenetrability of the skin, these largest of land mammalia are singularly liable to be tormented by insects, and to protect themselves against the latter, are accustomed to take mud-baths, wallowing in the mud of rivers, and thus covering their skin with a layer of clay, which renders them less exposed to the attack of their enemies. Mohr, the German explorer, lately informs us that he has seen the African E. dig a kind of pit or bathing-tub near a pond or river which has a steep wall in front, the pit being about the same height and breadth as himself. The animal, when about to take his bath, sprinkles water on the sides of his bath so as to moisten the clay, and then rubbing his sides against the pit, coats his skin with the clay. These 'E. tubs' are especially numerous on the Zambesi. The pinna or outer ear is large and flat. The dorso-lumbar vertebræ, or those of the back and loins taken collectively, number twenty-three, not more than three being lumbar bones. There are four sacral vertebræ, and the tail is short. The bodies of the vertebræ are much more flattened than in any other terrestrial mammal; and the vertebræ of the neck being especially flattened, this organ is in consequence very short. The object of this arrangement is to afford strength and solidity to the spine. The skull is very large in proportion to the body; its great size being due chiefly to the development of air-cavities in the *diploë* or middle layer of the cranium. Thus in old elephants the space between the inner and outer layers of the skull, especially in the frontal or forehead region, may be actually greater than the breadth of the cylindrical and elongated cavity containing the brain itself. The nasal bones are shortened, and the pre-maxillæ, or front portions of the upper jaw, are elongated. The radius of the fore-arm is fixed in a prone position, and crosses the ulna, its neighbour bone, in an oblique manner; this position preventing any movement of rotation such as is possessed by man. The fingers, wrist, and metacarpus or palm, are all shortened and thickened. The ilia or haunch-bones are expanded from side to side. The thighbones are long and slender, and when the animal is at rest, are directed perpendicularly to the axis of the trunk, and do not form an acute angle as in quadrupeds generally. The ham-muscles consequently extend to the middle of the hind-limbs, and this arrangement causes the peculiar and somewhat awkward gait of these animals, the whole leg being apparently lifted from its middle joint. The tibiæ shin-bones are short, and the foot and ankle bones are compressed. The thumb may consist of a single bone only in some cases. Two kinds of teeth only are developed—incisors and molars. The former have no enamel, and are entirely composed of dentine (or ivory) and cement. All living elephants possess incisors in the upper jaw alone, but the Dinotherium (q. v.) possessed lower incisors as well. The incisors further exhibit a peculiarity, in that, as they spring



Indian Elephant.

from permanent pulps, they continue to grow through the lifetime of the animal, and thus constitute tusks. The molar teeth exhibit a peculiar pattern, being essentially composed of alternating plates of enamel and cement, variously arranged in different patterns. In living elephants, only the incisors are preceded by milk teeth. The molars number six on each side in upper and lower jaws, and as the foremost molars are worn away, those behind are pushed forward to supply their place. The stomach is simple. No gall-bladder exists. The cerebellum or lesser brain is uncovered by the cerebrum or true brain, the cerebral hemispheres being largely and deeply convoluted. The males possess two large *vesiculæ seminales*, and four prostate glands; and the uterus of the females is divided above into two *cornua* or processes. The E. goes with young about two years, and a single young one is produced at a birth.

The two species of living elephants are the Indian E. (*Elephas* or *Enlephas Indicus*), and the African E. (*Loxodon* or *E. Africanus*). A variety of the former has been described under the name of Ceylon E., whilst the famous 'white elephants' are albino varieties of the Indian species. The Indian elephants possess tusks in the males only. No lower incisors are present, and the molars number one or two on each side of each jaw, and exhibit on their crowns a transverse or cross arrangement of the enamel plates. The forehead is concave, the ears small, the skull pyramidal; whilst the fore-feet possess five, and the hind-feet four hoofs. The colour is a pale brown, inclining to grey. The African E. has a convex forehead, very large ears, four hoofs on the front-feet, and only three on the hind-feet. Both males and females have tusks, those of the males being the larger, and weighing in large specimens 50 to 70 lbs. each. The length of full-grown tusks is about 6 or 7 feet. The Indian E. attains to 10, and the African to 12 feet in height. Both species are plant-eaters, and feed on grasses and on the leaves and bark of trees. Water is sucked up in drinking into the trunk, and is then squirted into the mouth from the proboscis. The E. without the tip of its proboscis is a very helpless animal, as exemplified by a female African E. now (1876) living in the gardens of the Zoological Society of London. The trunk, composed of several hundreds of delicate muscles enabling it to move in every direction, ends in a finger-like process, where the nostrils are situated. This process aids the animal in picking up the smallest substances, and from its extreme sensibility also serves as an organ of touch. Of the two species, the Indian E. far exceeds its African neighbour in docility, intelligence, and tractability. The latter never attains a high degree of familiarity with man, and can never be so thoroughly domesticated as the Indian E. The African E. is hunted for its ivory and hide. The tusks are chiefly obtained from Senegambia, Guinea, Sofala, and Mozambique. The Indian ivory, and especially that obtained from Ceylon, is very highly esteemed. Over 50,000 tusks are annually imported, these weighing about 10,000 cwt. The Indian E. is employed extensively in Asia as a beast of burden. Of its intelligence and remarkable instinct many curious tales may be related. In no part of their history, perhaps, do elephants exhibit greater intelligence, than in their participation in the stratagems whereby wild members of their species are captured. These latter live in herds in the depths of forests, and apparently resort continually to one place to drink and bathe. Wild males are captured by decoy-females, who exhibit a pretence of fondness for them, while, in the meantime, the males are being stealthily secured by ropes or cables attached to adjoining trees. Left tied, the wild elephants are subdued by hunger and thirst. Whole herds may be captured by being led by decoy-elephants into large traps enclosed by firm stakes. Elephants rarely breed in a domesticated state; the African, however, breeding oftener in captivity than the Indian species.

Fossil and extinct elephants are known to geologists from numerous fossil remains. The more important of these extinct species are described under DINOTHERIUM, MAMMOTH, &c. The general distribution in time of the *Proboscidea* may in the present instance be briefly referred to. In the Miocene rocks of India six fossil species have been discovered, and a true E. (*E. antiquus*) occurs in the Pliocene rocks of Europe. The latter is found in Italian and French deposits of this age, and appears to have survived the glacial epoch. The Mammoth (q. v.) (*E. primigenius*) is the best-known Post-Pliocene E., and other forms of this age are the donkey E. (*E. Melitensis*) of Malta, so named from its small size; and the pigmy E. (*E. Falconeri*), which did not exceed 2½ feet in height. The Mastodon (q. v.) is of Miocene, Pliocene, and Pleistocene age, whilst the Dinotherium occurs in Miocene strata.

Elephan'ta (Hind. *Garahou*), a celebrated island of India, in Bombay harbour, 6 miles E. of the city of Bombay. It is 5 miles in circumference, is traversed by two long hills separated by a narrow valley, and has springs of good water. The few inhabitants cultivate rice and rear sheep and poultry for the market of Bombay. E. is chiefly famous, however, for its cave temples. Near the landing-place stands a clumsy stone elephant, now greatly decayed, from which the island derived its European name. A little further on is the great temple, an artificial cavern, 130 feet long, 133 feet broad, and of an average height of 17 feet. The rock is a kind of basalt or porphyry; and the roof owes its support to peculiar massive columns. Within the entrance there is a gigantic figure, consisting merely of a bust and three heads, which itself serves as a pillar. This figure is 23 feet in circumference, and is supposed to represent the Hindu triad; but from the rest of the figures and the emblems on the walls, it seems probable that the temple was dedicated to the god Siva. There are also two similar temples on a small scale. Nothing whatever is known of the origin of these caves. From the mouldering nature of the stone, it may be assumed that the temples are of no great antiquity. No religious worship is now conducted here; but it is a favourite resort of Bombay pleasure-seekers. A banquet was given here in honour of the Prince of Wales in 1875.

Elephant Fish, a name given to the *Callorhynchus antarctica*, an Elasmobranchiate fish, nearly allied to the *Chimæra* (q. v.) or 'king of the herrings,' and included in the division *Holocephali* of the above order of fishes. It derives its name from its long snout, the tip of which is bent backwards like a hoe.

Elephant-Grass (*Typha elephantina*), a species of bulrushes belonging to the *Typhaceæ* or Bulrush order. This plant affords a large quantity of pollen which in Scinde is used for making a kind of bread, to which the name of *boor* or *booree* is given. The familiar name of the grass is derived from the fact of elephants feeding largely upon it.

Elephant Hawk-Moth (*Deilephila elpenor*), a genus of Lepidopterous insects belonging to the *Sphingina* or hawk-moths, which are distinguished by the antennæ being thickened in the middle or at their tips. The wings are long and narrow, and the trunk or proboscis is well developed. This moth has the body tinted rosy red, varied with light-green. The light green of the wings is prettily contrasted with rose-coloured bands; and the hinder wings have a black base fringed with white. The E. H.-M. is known in France as the 'vine sphinx.' It produces two broods annually, the larvæ making a cocoon on the ground by binding mosses and leaves together.



Elephant Hawk-Moth.

Elephanti'asis (from the Gr. *elephas*, 'elephant'), is sometimes called *E. Arabum*, *Bucnemia tropica*, and *Barbadoes leg*. The name is derived from a resemblance of the limbs of those affected with the disease to the huge rough limbs of the elephant. E. is a tropical disease common in India, Arabia, and Africa. The legs are the parts most frequently affected, but the disease attacks also the arms and the scrotum. In some cases the hypertrophy is so enormous that those affected are unable to walk; but although the limbs may be thus enlarged, the hands and feet are usually of normal size. There are at least two varieties of the disease. In the simplest form there is hypertrophy only, and no inconvenience is felt except from size and weight. In the more complex form there is, in addition, the product of morbid action, the parts being hard like stone, and the skin rough like the bark of a tree. The cause of the disease is not definitely known, but it is probably hereditary, and depends on some fault

in dietetics. The simple form is gradual in its development, and without constitutional disturbance; but the complex, or tubercular, is accompanied with febrile action, and appears to be a product of inflammation. No cure for E. has been discovered. In scrotal E. the morbid growth is frequently removed by excision.

Elephanti'ne, called *Jesiret el Sag*, the 'blooming,' or *Jesiret-Assouan*, a small island in the Nile opposite Assouan (q. v.), at the foot of the first cataract. Its old Egyptian name was *Ebo*, 'the town of elephants,' *eb* being the hieroglyphic symbol for *elephant* and *ivory*. In former times it was of strategic importance from its position on the southern frontier of Egypt Proper. It was remarkable for its fertility, and was the seat of a monarchy, the only existing relic of which is a list of the names of nine kings. It formed the southern limit of the Roman empire under the later Cæsars. There are remains of temples to Kneph and Ammon, a tower with sculptures of the time of Alexander the Great, and a Nilometer, consisting of a staircase descending into the river and bearing graduated scales and inscriptions showing the heights to which the Nile rose at certain periods under the Cæsars. See Sir Gardner Wilkinson's *Manners and Customs of the Egyptians*.

Elephant-Seal, or **Sea-Elephant**, names given to several large species of Seals (q. v.), of which the best known is the *Moringa* (or *Macrorhinus*) *proboscidea*. The nose of the males is elongated to form a short proboscis. The teeth number four upper and two lower incisors, two canines, six præmolars, and four molars in each jaw. The incisors are of conical shape, and the canines are very stout and pointed. The colour of the fur is a bluish-grey in the males, deepening into dark brown; the fur of the females being darker. The length of a full-grown male nearly equals 30 feet, and they are from 15 to 18 feet in circumference at their greatest girth. The skin is prized as a 'sealskin,' whilst the oil is also valued, the male affording about seventy gallons. These animals are polygamous, and the males fight desperately for the possession of the females. They feed chiefly on seaweeds. They are found on the Falkland Islands, Kerguelen Island, S. Shetland, and neighbouring S. Pacific islands.

Elephant's Ear, a name popularly applied to the species of *Begonias*—plants belonging to the natural order *Begoniaceæ*—from the appearance of their oblique stipulate leaves. These plants occur in the E. and W. Indies and in S. America. See BEGONIACEÆ.

Elephant's Foot, or **Hottentots' Bread** (*Testudinaria elephantipes*), a genus of Monocotyledonous plants belonging to the order *Dioscoreaceæ*, or that of the 'Yams' (q. v.), and so named from the form of the shortened tuberous stem or rootstock, which is rough and tuberculate, and gives origin to a weak climbing stem. The name 'tortoise-plant' has also been given to this plant, from the shape of the stem suggesting that of a tortoise. The central cellular part of the stem is eaten by the Hottentots. The name E. F. is also applied to the species of *Elephantopus*, a genus of plants belonging to the order *Compositæ*, the radical leaves of which are of large size.

Elephant-Tusk Shell (*Dentalium*), a genus of Gasteropodous mollusca belonging to the family *Dentalidæ*, in which the shell is tubular and curved, shaped like an elephant's tusk, open at both ends, and possessing a circular aperture. The foot is pointed, and has symmetrical side lobes, from the presence of which Huxley inclines to place the *Dentalium* among the Pteropodous molluscs. The head is rudimentary, and the intestine has a neural flexure. *Dentalium arcuatum* is a familiar species.

Elephant, White, an ancient and exclusive Danish order of knighthood, in which the number of knights, other than those of the Danish royal family, was only thirty.

Eletta'ria. See CARDAMOM.

Eleusin'ian Mysteries. These venerable solemnities were begun at Eleusis by the special command of the goddess Demeter, and in connection with the suffering she endured by the rape of her daughter Persephone, and with her joy on Persephone's return from Hades. When Eleusis was absorbed into Athens, there was an increase of dignity in its great festival; but the oversight of it remained with the descendants of Eumolpus, and the most important rites continued to be performed at Eleusis. The lesser mysteries, celebrated in February, were in honour of Persephone, The Daughter; the greater, in August, in honour of Demeter, The Mother. The former took place at Agræ on the Ilissus, and were a preparation for the great mysteries. The chief rites were the sacrifice of a sow, and initiatory purification by a priest. The great mysteries lasted for nine days, and were held both at Athens and Eleusis. On the first day, the initiated assembled at Athens; on the second, they went in procession to the seaside to be purified; the third was a day of fasting and sacrifice; on the fourth day a procession took place with a basket containing pomegranates and poppy-seeds, carried on a waggon drawn by oxen, and followed by women; the fifth was the torch day, when the initiated (or *mystæ*), led by the torch-bearer, went in the evening with torches to the temple of Demeter at Eleusis; the sixth was the most important day of the festival, when the statue of Iacchus, son of Demeter, was carried along the sacred way to Eleusis, accompanied by vast crowds shouting and singing; on the following day the initiated returned to Athens; the eighth day was supplementary, and was added in honour of Æsculapius; and on the last day a libation of wine was offered in the ceremony 'Plemochoæ.' These were the external rites of this festival, but we possess no certain knowledge of the doctrines revealed to the initiated in the celebration of the mysteries.

Eleu'sis, a town of Attica, was situated in the Thriasian plain, opposite to the island of Salamis, and near the borders of Megaris. It was on the road from Athens to the Isthmus. It was the chief seat of the worship of Demeter and Persephone. See ELEUSINIAN MYSTERIES.

Eleu'thera, the most productive, and, after New Providence, the most populous of the Bahama Islands, is separated from Abaco by N. E. Providence Channel, about 28 miles in width. It is long and narrow, has an area of about 100 sq. miles, and a pop. of between 5000 and 6000, engaged for the most part in the culture of the pine-apple, orange, and lemon. In 1870 sixty-two vessels of 5102 tons entered and cleared.

Eleuthe'ria Bark, a name occasionally given to the bark of the Croton E. and Cascarilla Bark (q. v.). It derives its name from the island of Eleuthera, from which it is imported.

El'evated, the term applied to wings turned upwards in an armorial bearing or other heraldic device.

Eleva'tion, in architecture, a vertical plan of the front or of any external face of a building in which the proportions are set out geometrically, exactly as they are to exist in the actual building, and not as they would appear subject to the laws of perspective.

Elevation, in astronomy, is the height of a body above the horizon in angular measure. Obviously, then, the E. of the equator is the complement of that of the pole, which latter is equal to the latitude of the place. A star is at its maximum E. when it is situated on the meridian of the place of observation.

Eleventh, in music, an interval of an octave and a fourth.

Elf and **Elves**. See FAIRIES.

Elf Arrow-Heads. See FLINT ARROW-HEADS and FLINT IMPLEMENTS.

El'gin, the chief town of Elgin or Moray shire, is beautifully situated in the vale of the Lossie, 5 miles from the mouth of that stream and 177 miles N. of Edinburgh. E., formerly interesting chiefly from the beauty of its situation and the number of its fine antiquities, has considerably altered within recent years. Surrounded by new and elegant villas, the residences of the gentry that have been attracted to a town which as a place of residence offers so many advantages, it has emerged from the quiet that was until lately its chief characteristic, and is now a county town of some gaiety, much exclusiveness, and no trade. It is a station on the Aberdeen and Inverness Railway, and is accessible also by the Highland Railway. With the other 'E. burghs'—Banff, Peterhead, Inverury, Cullen, and Kintore—it returns a member to Parliament. E., the ancient *Helgin* (named after *Helgyn*, a Norse chief), was the seat of a royal castle prior to

the reign of William the Lion. Of its beautiful cathedral, one of the finest and most interesting remains in the country, the most ancient (Early English) portions were commenced by Bishop Moray in 1224, when the see of Moray was transferred hither from Spynie. The vicissitudes of ages have reduced it to ruin. Other fine buildings were the church of St Giles and the monastery of the Black Friars, both of which have been demolished. The walls of the church of the convent of Grey Friars still remain. The ruins of the ancient castle crown the elevation known as the Lady Hill. Among the more modern buildings and institutions are Gray's Hospital, a useful institution built and endowed in terms of a bequest of £20,000 left by Dr Alexander Gray of Bengal; the E. or Anderson Institution, which has had its origin similarly in a bequest of £70,000 by Major-General Anderson; the new Court-house and Union Bank. Pop. (1871) 7340.

Elgin and Kincardine, Thomas Bruce, Seventh Earl of, was born July 20, 1766. Educated at St Andrew's, Paris, and in Germany, he entered the army, and rose to the position of general. He was occupied mainly, however, as a diplomatist, and it was while (1799) British envoy at Constantinople that he rescued the Elgin Marbles (q. v.) from the Turks, and brought them to this country. In answer to his critics and assailants in connection with this matter, E. published in 1810 a volume entitled *Memorandum on the Subject of the Earl of Elgin's Pursuits in Greece*. For half a century he was a Scotch representative peer. He died at Paris, November 14, 1841.—**James Bruce, Earl of E. and Kincardine,** a distinguished statesman and diplomatist, son of the preceding, was born in Park Lane, London, July 20, 1811, was educated at Oxford, and succeeded to the peerage in 1841 on the death of his father. In 1842 he was appointed governor of Jamaica, and in this post, which he held for four years, he showed so much ability, that in 1846 he was made governor-general of Canada, when that dependency was in a state of great discontent. E. restored order, while he settled the 'Fisheries' question, established free trade between the United States and British North America, and introduced the wise policy of self-government into the colony. Although at one time so unpopular that in 1849 he was assaulted by a mob in Montreal for assenting to a bill indemnifying those inhabitants of Lower Canada whose property had been injured or destroyed by the rebellion of 1837–38, he was a universal favourite before he left Canada in 1855. In 1849 he was made a peer of the United Kingdom. In 1857, in consequence of difficulties with China, E. was sent out as Plenipotentiary, and after delay caused by sending the troops under his direction to India to assist in suppressing the Mutiny, he arranged, along with the French Plenipotentiary, Baron Gros, the Treaty of Tientsin (1858), making China freer than it had hitherto been to foreigners. He also concluded a somewhat similar treaty with Japan. Having returned to his native country to fill the office of Postmaster-General, he was soon recalled to China by a treacherous onslaught of the Chinese upon a British squadron, but with the help of French allies he penetrated (1860) to Pekin, and dictated peace there. In 1861 E. succeeded Lord Canning as Viceroy of India, but died of fever, November 20, 1863, at Dhurumsala in the valley of Cashmere. E. has been succeeded in the earldom by his son, **Victor Alexander Bruce,** born at Montreal, 1849, and the son of his second wife, who was the daughter of the first Earl of Durham.

Elgin Marbles, a collection of statues and *alti* and *bassi relievi*, brought chiefly from the Parthenon of Athens by the Earl of Elgin, and purchased from him by Government in 1816 for £35,000. They are now in the British Museum. Lord Byron, in the *Curse of Minerva* and in *Childe Harold*, assailed Lord Elgin for despoiling 'Athena's poor remains,' and Payne Knight declared that the marbles were the works of journeymen unworthy the name of artists, a stricture which elicited an eloquent reply from Benjamin Haydon. It is now evident that the removal of these sculptures from Athens preserved them from mutilation or destruction, and has been most beneficial to English art. They are probably the work of Phidias (490–432 B.C.), and consist of:—(1) The Metopes, which represent the battle of the Centaurs and Lapithæ, a favourite subject of Greek art. According to Visconti, the footmen who are here represented grappling with the Centaurs are intended for the Athenian followers of Theseus. These metopes are considered the finest extant specimens of *alto relievo*. (2) The Frieze, which consisted originally of slabs 3 feet 4 inches in height, extending over 524 feet. Of this, 249 feet are preserved in the British Museum along with 76 feet in plaster casts of portions which were not conveyed to London. This frieze, the largest continuous piece of sculpture produced in Greece, is the perfection of bas-relief. It represents the procession of the *Panathenæa*, or great festival in honour of Minerva held every fifth year, and is unsurpassed for grace, majesty, and animation. It consists mainly of a line of horsemen advancing two abreast; but there are also bearers of vessels, flute-players, victims, and citizens on foot. The attitude of the figures, the distribution of the drapery is exquisitely varied; the champing horses and graceful riders uniting boldness of form with perfect truth to nature and faultless simplicity of design. 'The horses in the frieze,' said Flaxman, 'appear to live and move. We can scarcely suffer reason to persuade us they are not alive.' (3) Statues and fragments from the east and west pediments. Among these are part of a figure of Hyperion rising from the sea, the heads of the horses of Hyperion, Winged Victory, the Fates, head of one of the horses of Night, torsos of Cecrops, Ceres, fragments of Neptune and Minerva, the Ilissus, a lifelike figure, held by Canova to rival in merit the Theseus or Hercules, which last is a masterpiece of symmetry and truth, and the best-preserved of the marbles. Several of these sculptures seem to have been coloured, and adorned with precious stones and metal trappings.

The E. M. are unsurpassed for harmony and chastity of design, for grandeur of conception along with constant fidelity to nature. 'It is,' says Benjamin Haydon, 'the union of nature with ideal beauty—the probabilities and accidents of bone, flesh, and tendon from extension, action, or repose, that rank the E. M. above all other works of art in the world. Were the E. M. lost there would be as great a gap in art, as there would be in philosophy if Newton had never existed.' See *The E. M.*, by Sir Henry Ellis (2 vols. Lond. 1846); *Visconti on the Sculptures in the Collection of the Earl of Elgin* (Murray, Lond. 1816); *Life of Benjamin Haydon* (Longmans, Lond. 1853).

El'ginshire, Mor'ay or **Murr'ay Shire,** a county in the N. of Scotland, consisting of two portions, a smaller (inland) enclosed within the counties of Inverness, Nairn, and Banff, and a larger (maritime) bounded by these counties on the E., S., and W., but washed by the Moray Firth on the N. Area, 531 sq. miles; pop. (1871) 43,612. The Findhorn waters its N.W. corner; the Lossie flows through the middle of the maritime portion, past Elgin into Moray Firth at Lossiemouth; and the Spey flows partly through the county, partly along its eastern boundary. Covesea Caves, near the lighthouse of the same name, are large, intricate, natural windings in the rocks, formerly the resort of smugglers. The surface is mostly flat, and the 'Howe of Moray,' embracing the greater part of the area, is occupied by cultivated fields, of which wheat is the most common crop, and by fir and larch plantations. Sandstone, hard in texture and fine in colour, abounds. The soil is for the most part open and gravelly, with loams and clays in the N., which is very fertile. The climate is mild and dry. Wheat, oats, barley, and turnips are the principal crops. E. is the east part of the ancient province of Moray. It was early occupied by Scandinavian tribes, and here, as in the other north-eastern counties, the language, features, names, &c., of the inhabitants still retain distinctive traces of a Scandinavian origin. Elgin Cathedral, Pluscarden Priory, Kinloss Abbey, the 'Norman' church of Birnie, and Spynie Palace, are among the chief architectural antiquities, and there are many old and historically interesting castles. E. and the county of Nairn send a member to Parliament. The chief towns are Elgin and Forres.

Eli'as, St, a mountain belonging to the range of the Sea Alps, on the N.W. coast of N. America, on the American side of the boundary-line between British N. America and the United States territory of Alaska. It is 17,800 feet above the sea, and the chain of which it is the culminating point extends to the S.E. for nearly 100 miles along the coast.

Eli'jah (Heb. 'God-Jehovah'), 'the grandest and the most romantic character that Israel ever produced,' is called 'the Tishbite of the inhabitants of Gilead,' which is literally all that is known of his parentage and birthplace. The facts of his life, gathered in the Bible narrative, are briefly as follows:—Ahab,

the king of Israel, had introduced the religion of his wife's countrymen, the worship of the Phœnician Baal, and it is chiefly as a witness against this dishonour done to Jehovah that E. acts. He first appears on the scene (about 910 B.C.) announcing the vengeance of heaven in the shape of a severe drought and consequent famine. For this he had to flee from the vengeance of Ahab, and especially of Jezebel his wife. He hid himself at the brook Cherith, where his food was brought to him by ravens. From this he removed to Zarephath, between Tyre and Sidon, where he stayed with a widow, whose meal and oil he increased, and whose son he restored to life (1 Kings xvii.). After two years he reappeared before Ahab, and had his famous encounter with the prophets of Baal on Mount Carmel (1 Kings xviii.). Being in consequence again in danger of his life from the rage of Jezebel, he fled to the desert to the S. of Canaan. Arrived at Horeb, he had an interview with Jehovah, who comforted him and instructed him to appoint Elisha his successor. He again confronted Ahab, after his robbery of Naboth (1 Kings xxi.). After Ahab's death E. had occasion to denounce the conduct of his son Ahaziah, who had sent to consult the oracle of Baalzebub at Ekron (2 Kings i.). Finally he was taken up to heaven in a chariot of fire (2 Kings ii.).

There are serious difficulties in connection with E.'s biography, but the method of encountering them has not always been happy. To transform the 'ravens,' *e.g.*, into Arabs, merchants, &c., is a piece of trivial rationalism, whether done in the interests of revelation or against them. The whole career of the great prophet is enveloped in miracle, and cannot possibly be explained by hypotheses which reduce it to a commonplace level. Take away the startling, extraordinary, and marvellous element in his history, and his majestic character disappears along with it. There is nothing left that requires or deserves explanation; we need not suppose any veritable fact in the narrative at all. But great historical figures are not easily manufactured. It is more natural to suppose that the glowing and fearless genius of E. left a mark as true as it was indelible on the national memory; that his patriotic audacity involved him at times in deepest peril, and again secured him moments of supreme triumph. The mysterious Providence that moulds every life might shine out more vividly in this passionately-inspired man, and the circumstances and incidents of his heroic destiny might easily take a colouring of romance from the devotion of a grateful posterity, not because it had forgotten, but because it had remembered, his services to the Jehovistic faith of his fatherland. It may be difficult to reconcile E.'s letter to Jehoram King of Judah (2 Chron. xxi. 12-15) with the apparent date of his 'translation' (2 Kings ii.) five years earlier, but such a difficulty rather concerns a certain theory of inspiration than the really historic character of the record. No grander form stands out in the whole line of Hebrew prophets, nor did the reverence of later ages err when it exclusively associated his name with that of the great legislator himself.

Elimina'tion, in algebra, is the process by which from a given set of equations another is deduced, in which some of the original unknown quantities no longer appear. A system of n homogeneous equations in n variables cannot be satisfied by a common set of values unless there exists a certain definite relation between the coëfficients; and the algebraic expression which, equated to zero, represents this relation is termed the *eliminant* or *resultant* of the system of equations. This eliminant is a determinant of the nth order when the equations are linear. The only two works which can be said to give anything like a complete treatment of the subject are Faa de Bruno's *Théorie Générale d'Élimination*, and Salmon's *Higher Algebra*. The development of its theory and methods is chiefly due to Euler, Bezout, Sylvester, and Cayley.

El'iot, Sir John, an eminent English statesman and orator, in whom it has been well said 'centres the earlier struggle for parliamentary liberty,' was born of an old Devonshire family (since ennobled by the title of Earl of St Germains) in Cornwall, 20th April 1592. From an early age he showed a high and fearless spirit, and a vehement temper. After a careful education at Oxford he travelled for some time, and in 1614 entered public life as member for St Germains. E. obtained the favour of Buckingham, and from 1619 to 1623 held the office of Vice-Admiral of Devonshire, receiving the honour of knighthood. E.'s activity, however, in the suppression of piracy, out of which Buckingham wished to make profit, caused him to lose ground with his patron, and he was even thrown into prison. Early in the reign of Charles I. E., now member for Newport, became prominent as the leader of the Parliamentary or Country party, and the uncompromising opponent of Buckingham. Fixing upon the responsibility of the king's ministers to Parliament as the leading principle of constitutional government, he led the House of Commons by a series of remarkable speeches to impeach the minister, and in this course he persisted, although he was thrown into prison for ten days. He was the prime mover of the first Grand Remonstrance on the 'state of the realm,' which preceded the assassination of Buckingham, and in the third Parliament of Charles denounced the dissolution which the infatuated monarch had determined on, saying, 'Some have gone about to break Parliaments, but in the end Parliaments have broken them.' In 1629 he was, along with two other leaders of his party, thrown into the Tower on the charge of disobedience to the royal commands, and ordered before liberation to pay fines of £2000, £1000, and £500. He refused, and his confinement was so rigorous that his health broke down, and he died 27th November 1632. He had spent his time in prison in corresponding with his family and political friends, and in writing—among his works being a fragmentary *Memoir*, and an *Apology for Socrates*. The only complete biography of E. is that by the late Mr John Forster (2d ed. 1872).

Eliot, George, the literary pseudonym adopted in 1857 by Marian Evans, one of the greatest of English novelists. The daughter of a land-agent, she was born near Nuneaton, Warwickshire, November 22, 1820, and received her early education at Coventry. Among her first efforts were translations of Strauss's *Leben Jesu* (1846) and Feuerbach's *Wesen des Christenthums* (1853); and, after a residence at Geneva (1849-51), she settled in London, becoming sub-editor of the *Westminster Review*. In the autumn of 1856 the editor of *Blackwood's Magazine* received from Mr. George Henry Lewes, as the work of an anonymous friend, the first of those *Scenes of Clerical Life* whose appearance next year proclaimed the rise of a new master-mind —a woman's, as Dickens was probably first to divine. They were followed in brilliant succession by *Adam Bede* (1859), *The Mill on the Floss* (1860), *Silas Marner* (1861), *Romola* (1863), *Felix Holt* (1866), *Middlemarch* (1872), and *Daniel Deronda* (1876). G. E. also published poems—the longest, *The Spanish Gypsy* (1868); the most powerful, *The Legend of Jubal* (1870)—and a volume of essays, *Theophrastus Such* (1879); but it is her novels that give her a claim to be remembered as the most commanding genius that has appeared among women in the whole realm of literature. Her special sphere that quiet English country life which she had known in early youth, they all are mainly distinguished by philosophic thought and profusion of scientific illustration, by intensity of unsectarian religious thought, by familiarity with the subtler processes of the mind, and with both the outer and the inner life of English society, and by a pure and strong sympathy with human knowledge. *Romola*, deemed by some 'a magnificent piece of cram,' by more regarded as her masterpiece, is altogether exceptional, a picture of Florentine life in the days of Savonarola. G. E. married first G. H. Lewes (q. v.), and afterwards a Mr. Cross. She died in Cheyne Walk, Chelsea, December 22, 1880.

Eliot, John, the 'Apostle of the Indians,' was born at Nasing, Essex, in 1604, educated at Cambridge, and emigrated to Massachusetts in 1631. He became pastor of the church in Roxbury near Boston, and applied himself to the Indian languages. In 1646, with a few friends, he went to a company of Indians and explained to them the Christian religion. Encouraged by the interest they evinced, he obtained a grant of land from the colonial government on which the Indians might settle and become civilised. By 1674 there were fourteen such settlements, to all of which E. preached. Though still pastor of Roxbury, he regularly travelled through forests and swamps to visit his dusky converts. In 1660 the important Indian church of Natick was formed. About this time E. published the New Testament in the Indian language, and three years after the Old Testament, the first Bible printed in America—a work of great philological interest. E. also instituted schools and wrote school books for the Indians. He died May 20, 1690. See biography by Small, prefixed to facsimile of his *Indian Primer* (Edinb. 1878).

Elis, an ancient division of the Peloponnesus, extended from Achaia on the N. to Messenia on the S., and from Arcadia in the E. to the Ionian Sea on the W. It was divided into three parts—E. Proper, or Hollow E., in the N., which consists of a fertile plain watered by the river Peneus; Pisatis, in the middle, which is the lower valley of the Alpheus; and Triphylia ('the country of the three tribes') in the S. E. contains more fertile land than any other division of the Peloponnesus, and produced in abundance wheat, flax, cotton, and grapes. Its rich pastures reared numerous horses and cattle, and it still contains much excellent timber. It possessed the temple of Olympian Zeus, whose festival, celebrated once in four years at Olympia, drew thither strangers in vast numbers; and in consequence of the sacred character which it thus acquired, its soil was regarded by the Greeks as inviolable. These games were abolished by Theodosius A.D. 394. Of the ancient city of E., now *Kaloskopi*, the existing remains are scanty. Its gymnasium was by far the largest in Greece, and in it the competitors at the Olympic games were compelled to undergo a month's training before the competition.

Eli'sha (Heb. 'God the deliverer'), the disciple and successor of Elijah, held the office of prophet in Israel for a period of not less than sixty-five years [called at least four years before the death of Ahab (1 Kings xix.-xxii.) and died in the reign of Joash]. This prophet presents a striking contrast in appearance, manners, and character to his predecessor. Elijah, with his disordered locks and rough dress, was a true son of the desert, and made the desert his home; E. was a civilised man, dressed in the ordinary style, and frequenting the haunts of men. In character the former was distinguished by fiery zeal against all that opposed Jehovah; the latter, by toleration towards the false religions and general beneficence. The most remarkable feature of the history of E. is the great number of miracles he performed, and the astonishing nature of some of them—*e.g.*, the horses and chariots of fire that encompassed him at Samaria; the smiting of the Syrian host with blindness, and their subsequent capture; the swimming of the iron in the water; the raising to life of a dead man by touching the bones of the buried prophet—in all of which E. appears not like one on whom a double portion of Elijah's spirit had fallen, but rather as an Oriental thaumaturgist. The moral and spiritual elements are awanting in the circumstances of his career. We cannot discover in him an instructor and guide of the people, and, except in a certain mildness and gentleness of character, to which the maniacal outburst of temper at Bethel, when he cursed the children in the name of the Lord, and procured their destruction, forms a startling exception, there is little to justify the parallel drawn between him and Christ.

Elisors. If the sheriff, or coroner, who ought to return the jury be a party to a suit, or interested in it, the *venire* (see VENIRE FACIAS) is directed to two clerks of the court, or to two persons of the county named by the court and sworn; and these two, who are called E., or electors, shall name the jury.

Elix'ir (Arab. *al-iksir*, 'quintessence'), a term in chemistry and modern pharmacy used to denote a tincture with more than one base, or a compound tincture. Among the alchemists an E. denoted a liquor for transmuting metals into gold, and in later times a quintessence, a cordial, or a substance which invigorates. The term tincture is now more common. A great variety of medicines have appeared under the term *E. vitæ*, or E. of life, which are merely compound tinctures of aromatic and stimulating substances. The elixirs best known in pharmacy are the following:—E. paregoric, or *Tinctura camphoræ composita*, a preparation of opium, benzoic acid, camphor, oil of anise, and proof spirit, an excellent remedy for allaying spasmodic cough in bronchitis and phthisis; dose, from 15 to 60 minims; 1 drachm contains ¼-grain powder of opium = ⅛ grain of extract. E. of vitriol, or *Acidum sulphuricum aromaticum*, is prepared from sulphuric acid, rectified spirit, cinnamon, and ginger. It is used for making an acid drink, and for checking profuse perspiration. Tincture of aloes and myrrh is sometimes called *E. proprietatis*. This preparation is adapted to torpid conditions of the bowels and of the uterine system.

Elis'abetgrad, a town in the government of Kherson, Russia, on the Ingul, 130 miles N. by W. of Kherson. It has an arsenal with six bastions, and there are four suburbs. The streets, spacious and well built, are in some instances lined with trees. E. has a good general trade and an important annual fair. Pop. (1867) 31,968.

Eliz'abeth, Queen of England, the daughter of Henry VIII. and Anne Boleyn, was born 7th September 1533. She shared her mother's disgrace, and was for a time in seclusion. From this she was allowed for a short period to emerge, but was again disgraced and declared illegitimate along with her sister Mary. In the reign of Edward VI. E. appeared at court, and having avowed herself a Protestant, was looked upon as the hope of the Protestant party. But in the reign of Mary, though she conformed to Papistry, she once more suffered under the royal displeasure. Accused of being concerned in the plot of Sir Thomas Wyatt, she was sent to the Tower in 1554, and would have probably been beheaded but for the fear of a Protestant rising. On her release she was transferred to Woodstock, and then allowed to remain at her residence, Hatfield House, in Hertfordshire, till the death of Mary, 17th November 1558.

These hardships made E. the singular and successful sovereign she is universally recognised to have been. From her father she inherited courage, pride, frankness, bluff and sometimes brutal manners, cordiality in her dealings with, and a genuine love for, her subjects; from her mother a sensuous nature, a commanding figure, and love of flattery. But her early education in the school of solitude and misfortune rendered her capable of subordinating the gratification of her passions to that of her intellect, taught her what was then the politician's chief art, dissimulation, and made her the most accomplished and eccentric woman of her time. While her brother Edward VI. thought her the essence of propriety, and called her his 'sweet sister Temperance,' she was coquetting outrageously with Lord Seymour, and yet she jested at his death. Her varied culture at court and in retirement made her at once a graceful dancer and musician, a skilful horsewoman, a devotee to classics and to the 'new literature,' as familiar with Tasso and Ariosto as with Demosthenes; 'she could talk poetry with Spenser and philosophy with Bruno; she could discuss euphuism with Lyly, and enjoy the chivalry of Essex; she could turn from talk of the court fashions to pore with Cecil over despatches and treasury books; she could pass from talking business with Walsingham to settle points of doctrine with Parker, or to calculate with Frobisher the chances of a N.W. passage to the Indies.' Extravagantly fond of rich dresses, jewels, and gorgeous processions, she was also extremely economical. She detested war on account of its expense, and grumbled at the bill she had to pay for the defeat of the Armada. Although her passions frequently led her astray, she never let them seriously affect her public policy; throughout her reign she was guided by the counsels of the Cecils, and not by those of Leicester and Essex.

When E. ascended the throne in her twenty-fifth year, she was welcomed by all classes, Catholics as well as Protestants, for her religious opinions were known to be moderate, and domestic misgovernment, national disorders, and religious fanaticism had made the name of Mary in the last degree odious. Circumstances, more than religious sentiment, made E. a Protestant sovereign. She fell back upon what her father did. The majority in her first Parliament was Protestant, and it repealed the Statutes of Heresy, dissolved the monasteries which had been founded, deprived Mary's bishops of their office, restored the royal supremacy, and established the Church on the Prayer-Book of Edward VI. and the Thirty-Nine Articles. In her ecclesiastical policy she was aided by Parker, a moderate but resolute divine, who was made Archbishop of Canterbury in 1559, and in her foreign policy by William Cecil, Lord Burleigh. Although the former was non-revolutionary and the latter peaceful, yet the Act of Uniformity by which her Church policy was carried out led to bloody persecutions both of Romanists and of Puritans, or the Protestants who took their doctrines from Geneva, while the policy of Cecil ended in war. E. supported by money the Protestants struggling in France, in the Netherlands, and in Scotland. Her rival Mary Queen of Scots (q. v.), brought into collision with the Scottish nation, fled into England and was imprisoned by E. Being looked upon as the next heir to the throne, Mary became the hope of the Roman Catholic faction in England. Conspiracies were formed in her favour. The Dukes of Northumberland and Westmoreland headed a rebellion in the

north which was put down with great severity. Pope Pius V. published a bull absolving E.'s subjects from their allegiance to her. At length the discovery by the spies of Walsingham (q. v.) of a plot against her life by a Roman Catholic gentleman named Babington led to an outcry by Parliament for vengeance on Mary. She was charged with being accessory to Babington's plot, tried before a commission, and beheaded February 8, 1587, in the hall of Fotheringay Castle. Mary had bequeathed to Philip of Spain her rights upon England, and he, resenting the aid given to the Netherlanders, and the attacks made by British seamen on Spanish commerce, resolved on vengeance. The destruction of the 'Armada' (q. v.) was the greatest event in the reign of E. Dudley, Earl of Leicester, who had commanded one of the armies that was prepared to meet the troops of the Duke of Parma, died suddenly in the midst of the national rejoicings, and E. was never herself again. The latter years of her reign were occupied chiefly with Irish affairs. Hugh O'Neil, Earl of Tyrone, raised (in 1595) the flag of rebellion against the authority of England, which had been established in the reign of Henry VIII., and for a time overran Ireland. E. sent against him Essex, who had succeeded Leicester as her favourite, but Essex was not successful and made a delusive truce with Tyrone. He was in consequence recalled, and attempting an insurrection in London, was apprehended, tried, and beheaded 25th February 1601. Although Ireland was subsequently reduced to submission by Blount, Lord Mountjoy, E. fell into a state of utter despondency after the death of Essex, and, indeed, may be said to have outlived her time. She lived into a period of earnest Puritanism which failed to understand, still less to approve of, her vanity and irreligion; and although by skilful concessions, especially on the matter of monopolies, she avoided a collision with Parliament, she would, had she lived, probably have been found in opposition to the wishes of the second generation of her subjects. In the end her temper became intolerable. She chid her attendants and even her chief adviser, the second Cecil. She believed that she was beset with murderers, had a sword constantly beside her, and repeatedly thrust it through the arras. Finally she refused to take sustenance. Her last act was to indicate by a motion of her head that she wished her successor to be James VI. of Scotland. She died in her seventieth year, March 24, 1603.

The life of E. was essentially lonely and far from happy. She refused to be married, even when Parliament petitioned her, and declined the offers made by numerous and powerful suitors, including Henri of Anjou, the Duc d'Alençon, Prince Erik of Sweden, the Archduke Karl of Austria, and even, it is said, Philip of Spain; and yet that she felt her loneliness is plain from such ejaculations as that on hearing of the birth of a son to Mary Queen of Scots—'The Queen of Scots has a fair son, and I am but a barren stock.' It seems now to be proved beyond dispute that she would have gladly married the worthless Leicester, and it is far from certain that she did not stoop to be an accessory to the murder of Amy Robsart, Leicester's wife. Burleigh was able to prevent this marriage, but he was not able to persuade her to another.

'From the reign of E. may be said to date the material prosperity, the naval power, the commercial activity, and the literary glory of Great Britain. The great seamen and adventurers of the time, Hawkins, Drake, Frobisher, and Raleigh, made their country the mistress of the seas, and found an outlet for its commercial and colonising energy. What grew into the East India Company obtained its charter, and Birmingham, Manchester, and Sheffield became seats of manufactures. The general increase of wealth showed itself in an increase of luxury, in richer dresses and better houses than had hitherto been known. The first attempt was made by the suppression of mendicity to grapple with the problem of pauperism. The reign of E. saw the fulness of the literary glory of Sidney and Spenser, the death of Marlowe, and the rise of Shakespeare. See Camden's *Annales Rerum Anglicarum et Hibernicarum regnante Elisabetha* (Lond. 1615); Froude's *History of England* (vols. vii. to xii.), which is especially valuable for the extracts from the state-papers of Cecil, and the documents preserved in the archives at Simancas; also the authorities quoted in Green's *Short History of the English People* (1875).'

Elizabeth Stuart, Queen of Bohemia, born in 1596, was the daughter of James I. of England and Anne of Denmark. In 1613 she married the Elector Palatine, Friedrich V., who on the forced abdication of Ferdinand II. in 1619, was called to the throne of Bohemia. This he lost by the battle of Prague (8th November 1620), which drove the royal spouses to Holland. It was not till after the Peace of Westphalia that E.'s son Karl recovered his father's hereditary estates in the Palatinate. E.'s eldest son was christened Moritz by the Prince of Orange. E. died at London, 13th February 1662. She left a daughter, E., who, during her parents' retreat at Leyden, studied geometry and metaphysics with Descartes, who dedicated to her his *Principia*. This lady afterwards withdrew to the Abbey of Heroorden, which yielded her 20,000 dollars of income, and where she kept an open house for literary persons of all churches and creeds, Catholics as well as Free-thinkers, and Unitarians as well as Lutherans. She died in 1680. See Miss Benger's *Memoirs of E. S., Queen of Bohemia.*

Elizabeth of Valois, Queen of Spain, born at Fontainebleau 13th April 1545, was the daughter of Henri II. and Catherine de Médicis. 'The Princess of Peace' was promised in marriage first to Edward VI. of England, then to Don Carlos, but was ultimately married to Philip II. in 1559, the Duke of Alva appearing as proxy at Notre Dame. She met her husband at Guadalavara, and Brantôme says stared at him so much that Philip said, 'What are you looking at? Is my hair white?' After a short and unhappy life E. died at Madrid, 3d October 1568. See Brantôme's *Vie des Dames Illustres.*

Elizabeth, Queen of Spain, born 22d November 1602, was the daughter of Henri IV. and Marie de Médicis. She married Philip IV. of Spain in 1615, the Infanta Anna Maria of Austria being at the same time given to Louis XIII., a proceeding most distasteful to the Huguenots. E. had an enemy in the Minister Olivarez. She displayed political energy, and a strong love of her adopted country. She died 6th October 1644.

Elizabeth Farnese, Queen of Spain, born 25th October 1692, was the daughter of Odoardo II. of Parma. She was ill-treated by her parents, and was a singularly ugly and obstinate child. In 1714, on the suggestion of Alberoni and the Princess des Ursins, *camarera mayor* or first maid of honour at the Spanish court, she married Philip V., then a widower. Her first act was to drive Des Ursins from Spain. Her active mind at once assumed the mastery over Philip, whom she reconciled with the Duc d'Orleans. She supported the Inquisition, and substituted D'Aubenton for Robinet as the King's confessor. The Spaniards resented the increase of Italian influence at the court. The temporary abdication of the jealous and hypochondriac Philip and the reign of her stepson Louis interrupted her schemes, pursued in the European alliances, the Congress of Cambrai, the Congress of Soissons, &c., for securing the Two Sicilies and the Duchies of Parma and Piacenza to her son Carlos, who became King of Naples in 1734 and Charles II. of Spain in 1759. E. survived her husband until 1766. The 'tenacious termagant,' as Carlyle calls her, had great political ability; she spoke fluently in Spanish, Latin, German, and French. Among her younger children were Maria Anna, married to Joseph, King of Portugal, and Marie-Antoinette, married to Victor Amadeus, King of Sardinia. E.'s *Memoirs* were published in 4 vols. at London, 1746. See also Peralla, *Historia Civil*, and the innumerable private memoirs of the time (Noailles, Saint Simon, Duclos, &c.).

Elizabeth Christine of Brunswick-Wolfenbüttel, born 28th April 1691, was the daughter of Ludwig-Rudolf of Brunswick-Blankenburg. Her grandfather, Anton Ulrich, who wrote novels—'six vols. in 4to'—brought about her marriage with the Archduke Karl, who had been previously refused by Caroline of Anspach. This event in 1707 caused the elder Brunswick family to become Catholic. E. was proclaimed Queen of Spain at Barcelona, and after her husband's election as Emperor acted as regent there till the Peace of Utrecht (1713). She was then crowned at Presburg Queen of Hungary. On her husband's death in 1740, E. devoted herself to the cause of her daughter, the famous Maria Theresa. She founded the order of the Red and White Star, to be conferred by the Aulic Council of War on twenty-one superior officers who should have served Austria for thirty years. E.'s sister Charlotte married Alexius, the Czarovitch, and had a 'fabulous end.' Her sister Antoinette married Ferdinand Albrecht of Brunswick-Bevern, and became the mother of Friedrich the Great's wife. E. died 21st December 1750.

Elizabeth, Queen of Hungary and Poland, the daughter of Stephen, Ban of Bosnia, married in 1363 to Louis the Great, King of Hungary and Poland. After her husband's death E., as regent, assisted by the Palatine Nicolas of Gara, oppressed her subjects until the arrival of a Neapolitan prince, Charles of Durazzo, who was crowned in 1385, and soon after was murdered. E. was herself murdered in 1387 by the Ban of Croatia.

Elizabeth of Poland, Queen of Hungary and Transylvania, born in 1518, daughter of Sigismund I. of Poland, married to John Zapolski, whose death in 1540 left her in a difficult position between Ferdinand I. on the one hand, and the Sultan Solyman, who took possession of Hungary, on the other. E. offered to cede Transylvania to Ferdinand for Ratibor and Oppeln in Silesia, but the bargain was not carried out, and the Turks helped her to drive the Austrians from Transylvania. She died 20th September 1558, leaving a son Stephen, or John Sigismund.

Elizabeth Petrov'na, Empress of Russia, was the daughter of Peter the Great and Catharine I., and was born 18th December 1709. Contrary to the order of succession prescribed by the will of Catharine, on the death in 1730 of Peter II., the Dolgorouki family placed on the throne Anna, Duchess of Courland, a niece of Peter the Great. (See ANNA and BIRON.) But a palace insurrection made E. empress, 6th December 1741. In her reign capital punishment was abolished, but the activity of the 'Secret Chancery' caused the greatest misery, and the ancient authority of the Senate was restored. A successful war against Sweden was terminated by the Peace of Abo (1743), and E. selected the new King of Sweden, Adolf of Holstein-Gottorp. E. made her nephew, the Duke of Holstein (afterwards Peter III.), her presumptive heir, and gave him as wife Sophie of Anhalt-Zerbst (afterwards Catharine the Great). She encouraged education by founding a university at Moscow and an academy of fine arts at St Petersburg, and she gave to Voltaire the materials for his work on *Russia under Peter the Great*. There were many reasons for the war with Prussia—the influence of Bestuchef, 'corruptiblest brute of a chancellor ever known;' the war-policy of Schuwalof; the indignation of the Czarovitch, whose wife E. had insulted; and, lastly, a personal pique against Friedrich on the part of E. In the Seven Years' War her troops were repeatedly successful, and her death, 5th January 1762, was a fortunate thing for Friedrich, as her successor Peter was friendly to Prussia. E. earned for herself in Europe the shameful title of 'Catin du Nord.' She was grossly superstitious, being unable to face the dark; and extravagantly luxurious, leaving 15,000 unused dresses in her wardrobe. See Weydemeyer's *Zarstwowanie Elisawety Petrowny* (Petersb. 1834).

Elizabeth of Thuringia, St, daughter of King Andreas II. of Hungary, was born at Presburg in 1207. She was married at the age of fourteen to Ludwig, son of Hermann, Landgraf of Thuringia. When a girl, she astonished the court of Wartburg, the brilliant resort of the *minnesingers*, by her gentleness, benevolence, and piety. After her husband's death in the Fifth Crusade, his brother, Heinrich Raspe, stripped her of authority, which she afterwards declined to resume, contenting herself with her revenues as Landgräfinn. She spent her life in constant penances and benefactions, wandering about to relieve the sick and the poor, and was brutally maltreated by her fanatical confessor, Konrad of Marburg. Worn out by sufferings, she died, at the age of twenty-four, in 1231, in one of the many hospitals which she had erected in Germany. She was canonised in 1235. The victim of monkish cruelty and of her own false ideal of duty, she led a singularly mournful, stainless, and noble though mistaken life. In piety and self-sacrificing zeal she resembles the celebrated St Theresa. The story forms the subject of Kingsley's *Saint's Tragedy*. See Montalembert's *Histoire de Sainte Elisabeth de Hongrie* (Par. 1836).

Elizabe'than Ar'chitecture, a transition style of English architecture, unique in its origin, application, and duration. It arose with and reached its prime during the reign of Elizabeth, and its chief characteristic as an architectural style is a revived classicism engrafted upon the domestic Gothic of the Tudor period. The necessity for building great cathedrals passed away at the completion of the Reformation, and the hatred of symbols which now took possession of the nation's mind, and of the pride and pomp of the ceremonial of the old religion, as savouring of idolatry, was extended in part to the old religious houses. While many of these were destroyed or injured, no rich and splendid churches were being built for the Protestants, and architecture, no longer employed in building temples for God, was almost wholly occupied during Elizabeth's reign in building mansions for the nobility and gentry. It was evident that a Reformed people could not dwell in mansions the style and feeling of which were Gothic and Catholic; and as at this time—the earlier half of the 16th c.—a classic renaissance in literature and art was beginning to shed abroad its borrowed light, the architects of the period eagerly appropriated classical outline and detail, and modifying these by rules best known to themselves, and combining them with the chief structural features of the late domestic Perpendicular, they created E. A. This style prevailed for about a century. Though true neither to Gothic nor Classical architecture, E. A. is stately and picturesque. It embodied all the ideas of splendour and luxuriousness that prevailed during the 16th c., and its chief characteristics were great bay windows, long and wide galleries, vast elaborately-carved chimneypieces, panelled and wainscoted walls, spacious staircases with carved balustrades, heraldic figures, &c. Noble specimens of this architectural style are Campden House, Longleat, Holland House, Kensington, Hardwick, Burleigh, and Knowle. See Fergusson's *History of Architecture* (Murray, 1874).

Elizabeto'pol, a town of Russian Transcaucasia, on the Jansha, and capital of a government of the same name. It is divided into four quarters, two of which are inhabited by Armenians and two by Tartars. Pop. 15,439. The principal industries are horticulture and the rearing of bees, silkworms, and cattle. The *government* of E. had in 1871 a pop. of 529,412. Its chief products are madder, tobacco, lint, and grain.

Elk or **Moose Deer** (*Alces palmatus* or *Malchis*), the largest species of *Cervidæ* or Deer (q. v.) inhabiting N. Europe and America, being known under the name of 'Moose' in the latter continent. In the E. genus the neck is short and thick, and the hair bushy and coarse. A 'mane' exists on the throat, and the hind legs have tufts of hair above the metatarsus. The muzzle is broad and hairy, and the horns are large and 'palmed,' but have no basal 'snags,' or short branches near the crown. The tail is very short. The E. may attain a height of 7 feet at the shoulders. Its colour is a dark brown, the legs possessing lighter tints. The E. is hunted for the sake of its horns, skin, and flesh. It is wonderfully agile and swift, but is speedily overtaken in snow. When brought to bay, it will fight with great courage and ferocity. It may be domesticated and trained to carry burdens if captured young. The horns in a large specimen may weigh about 60 lbs. In Sweden the E. is not allowed to be hunted, and the chase is greatly restricted in Norway.


Elk.

Elk, Irish (*Megaceros Hibernicus*), a famous fossil and extinct genus of deer, supposed to be intermediate in structural position between the Reindeer (q. v.) and Fallow Deer (q. v.). Its remains occur in the Pleistocene or Post-tertiary deposits of Ireland, and also in deposits of similar age in England, Scotland, and on the Continent. This animal was of very large size, and the antlers were enormous, attaining an expanse of 10 feet from tip to tip, and a weight of between 70 and 100 lbs. The I. E. does not appear to have survived into the Prehistoric period.

El Khar'geh, the chief town of the Great Oasis, in the Libyan Desert, 115 miles W. of Esneh, on the Nile. The Khargeh and Dachel oases, taken together, form the Great Oasis. E. K. is the centre of numerous converging routes between the Nile on the E. and the oases on the W. and N. In the vicinity are extensive palm-groves, and there are numerous Egyptian, Roman, and Arabic remains. The oasis and town were visited by Schwein-

furth in the winter of 1873–74, by Rohlfs in 1874, and by the Grand Duke of Oldenburg in 1875. Pop. (1874) 3500.

Ell (Dutch *eln*, Fr. *aune*, Lat. *ulna*), a linear measure taken originally from the length of the fore-arm. The Flemish E. is 27 inches long; the French E. (see AUNE), 47¼ inches; and the English E., 45 inches.

Ell'enborough, Earl of, Edward Law, an English orator and statesman, was born September 8, 1790, educated at Eton and Cambridge, and became Lord Privy Seal under the Duke of Wellington (1828), and President of the Board of Control in the two administrations of Sir Robert Peel. In 1841 he was made Governor-General of India. In this capacity his policy was vigorous, and he aided in vindicating the British honour in Afghanistan, but gave great offence to the civil servants of the Company, while some of his proclamations—particularly that in regard to the sandal-wood gates of the temple of Somnauth—provoked much censure and ridicule. Ultimately E. was recalled (1844). He was, however, supported by the Government, appointed to the office of First Lord of the Admiralty, and raised to the dignity of earl and viscount. In Lord Derby's administration of 1858 E. became Indian Minister, but was again unfortunate; a despatch he sent to Viscount Canning rebuking him for what is known as his Oude Proclamation caused a great outcry, and compelled him to resign (1858). After this E. was one of the keenest and most eloquent of the critics of Liberal administrations. He died at his seat, Southam House, near Cheltenham, December 22, 1871. See Lord Colchester's *Defence of Lord E.'s Indian Administration* (Lond. 1875).

Ell'enrieder, Marie, a German painter, was born at Constance in 1791, studied art in her native place, but afterwards at Munich and Rome. At Karlsruhe, where she lived for some time, she painted a 'Martyrdom of St Stephen,' after which she was nominated court painter at Munich. After a second visit to Rome in 1839, she returned to Constance, where she settled till her death in June 1863. Such were the grace and sweetness of her heads of women and children that it has been said of her 'she painted with angels about her.' Her subjects were for the most part sacred. 'A Child Overtaken by a Thunderstorm' is her best-known *genre* work.

Elles'mere, Francis Egerton, Earl of, an English nobleman and man of letters, was the second son of the first Duke of Sutherland, and was born in London, January 1, 1800. He entered Parliament in 1822 as Lord Francis Leveson-Gower, and supported the cause of free-trade, and helped to establish the University of London. In 1846 he was elevated to the peerage as Earl of Ellesmere. He died 18th February 1857. E. was an ardent student and a respectable *littérateur*. In 1824 he published a translation of *Faust* with versions of lyrics from Goethe, Schiller, and others; *Mediterranean Sketches* (1843); *The Two Sieges of Vienna by the Turks* (1847); and *Guide to Northern Archæology* (1848).

Ellesmere, a town on the N. border of Shropshire, 10 miles S.W. of Whitchurch by railway. It has a church, part of which dates from the 14th c., and it is situated near a fine lake. Pop. (1871) 2013, mostly engaged in malting.

Ellesmere, Lake, in the province of Canterbury, New Zealand, 20 miles S. of Christchurch, has an area of 125 sq. miles. It receives the Selwyn, but has no outlet, except in wet seasons, when it overflows into the sea.

Ell'ichpoor, the chief town of the Berars, or assigned districts of the Nizam, 275 miles N. of Hyderabad, and 100 E. of Nagpur. It is a walled cantonment, and has a beautiful well and many fine tombs, surrounded by gardens. The trade is in local products. There are manufactures of cotton and silk fabrics, carved articles, lac ornaments, &c. Pop. (1867) 27,782. —The *district* is the most mountainous in the Berars. Area, 3160 sq. miles; pop. (1867) 344,358. In 1872 the gross revenue was £126,010. Thirty-nine per cent. of E. is cultivated, yielding chiefly jowari (a kind of millet), cotton, wheat, gram, tilseed, and sugar-cane. See *Official Gazetteer of the Berars*, by A. C. Lyall, C.S. (1869).

Ell'iot, an ancient Scottish border family, which has produced several distinguished men. The first really notable E. was **Gilbert**, 'the laird of Stobbs,' in Roxburghshire, who married a daughter of Scott of Harden, and was the grandfather of the Gilbert E. who was made a baronet in 1666. From the latter's younger son are descended the Earls of Minto; while his elder son was father of **George Augustus E.**, the defender of Gibraltar, who was born in 1718, entered the army at the age of fifteen, and distinguished himself at the battle of Dettingen and in the Seven Years' War. After the peace, he was made lieutenant-general, and having being appointed Governor of Gibraltar in 1775, he, in 1782, repelled the prolonged attacks of a Franco-Spanish force of 30,000 men, supported by ten floating batteries, and compelled the enemy to change the siege into a blockade, which ended in the Peace of Versailles, 20th January 1783. E. received the Order of the Bath, and afterwards the title of Lord Heathfield. He died 6th July 1790.—**Sir George E.**, brother of the first Earl of Minto, was born 12th August 1784, entered the navy, rose rapidly in the service, and in 1837 was appointed one of the Lords of the Admiralty, and Commander of the Fleet at the Cape of Good Hope. In 1840 he was appointed to the chief naval command in Chinese waters, and on the 5th of July he captured the island of Chusan. He was promoted vice-admiral in 1847, admiral in 1853, and died at Kensington, 24th June 1863.—**Sir Charles E., K.C.B.**, nephew of the preceding, was born in 1801, entered the navy in 1816, served in India, on the African coast, and in the W. Indies. In 1835 he was appointed Chief Commissioner and Plenipotentiary in China. He was in the centre of the diplomatic operations leading up to the ransom of Canton in August 1841, and was subsequently in succession Chargé d'Affaires in Texas (1842–46), Governor of Bermuda (1847–52), of Trinidad (1853–56), of St. Helena (1863–69). He died at Withycombe, Devon, September 9, 1875.—**Sir Henry Meiers E.**, son of John E. of Pimlico, was born in 1808, educated at Winchester, and entered the Indian civil service, the first of the competition set, in 1827. He became Secretary to the Government of India in the Foreign Department, and died at the Cape of Good Hope in 1853. His chief work was his posthumous *History of India as told by its own Historians* (6 vols. Lond. 1867). He also wrote a *Supplement to the Glossary of the Indian Terms*, from which was compiled *Memoirs on the Races of the North-Western Provinces of India* (Lond. 1859).

Elliot, Ebenezer, the 'Corn-law Rhymer,' was born near Rotherham, in Yorkshire, March 17, 1781. He began life in an iron-foundry, where his father was clerk. In 1821 he started an iron-work at Sheffield, and was so successful that he retired from business in 1841. He died near Barnsley, December 1, 1849. E.'s poems comprise—(1) Pieces descriptive of scenery and rural life, chiefly in Yorkshire, as, *The Vernal Walk*, *Night*, *Wharncliffe*, *The Village Patriarch*; (2) the political pieces, or *Corn-Law Rhymes*, to which he more especially owes his fame. These appeared between 1831 and 1836, and are marked by great fire of diction and a certain rude straightforward earnestness. In 1834, appeared a collected edition of E.'s works in 3 vols.; in 1840, a one vol. edition. See Carlyle's essay on the *Corn-Law Rhymes*, and an autobiographic sketch in the *Athenæum* of January 12, 1850.

Ellipse', a central curve of the second order, distinguished from the Hyperbola (q. v.) in having no infinite branches. It is one of the so-called conic sections, being the curve in which a right cone is intersected by a plane cutting its opposite sides obliquely. Every point on the circumference is such that the sum of the lines drawn from it to two certain fixed points inside the figure is equal to a constant quantity. These two points are called the *foci* (sing. *focus*). It is symmetrical with respect to two axes, the *major* and *minor*, in the former of which the foci lie. The double ordinate through either focus is called the parameter, and is a third proportional to the axes. Also, the square of any ordinate is less than, or differs in *defect* from, the rectangle contained by the abscissa and parameter—whence the name E. Its rectangular equation referred to the centre is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where a and b are the axes; and its polar equation referred to the focus is $r\,(1 + e\cos\phi) = a\,(1 - e^2)$, where e is the Eccentricity (q. v.), an equation of great importance in the planetary theory.

Ellip'sis (Gr. *elleipsis*, 'omission'), a figure in grammar and rhetoric, by which one or more words are omitted, to be filled

in by the imagination. It expresses strong feeling, and conduces to brevity and energy, as in many familiar phrases. The omission of connectives, as in 'The wind passeth over it—it is gone,' is called *asyndeton*, a figure of great importance with the Greek rhetoricians.

Ellip'soid, a surface of the second degree, whose *every* plane section is an ellipse. It is completely determined by its three rectangular axes, *a*, *b*, and *c*, its equation being $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$. If any two of these axes be equal, the surface becomes an E. of revolution or Spheroid (q. v.).

Ell'is, George, F.R.S., F.S.A., one of the earliest, soundest, and most tasteful of the scholars who have devoted themselves to Early English literature, was born in London in 1745. He was educated at Westminster school and at Cambridge, was one of the authors of the *Rolliad*, a satire on Pitt, with whom he afterwards became reconciled; accompanied Lord Malmesbury as secretary to Lisle in 1797; became a contributor to the *Anti-Jacobin*, and died April 15, 1815. Walter Scott said E. was the best converser he had known. E.'s works are *Specimens of the Early English Poets* (3 vols. 1790); *Specimens of English Metrical Romances; Essay on the Formation and Progress of the English Language;* and a preface, notes, and appendix to Le Grand's *Fabliaux*. E. renders the quaint language of mediæval poets into modern English with a graceful ease which is made doubly charming by a curious combination of genuine sympathy with mocking humour. He was a worthy forerunner of the new school of critics and historians who have revived an interest in our early literature.—**William E.**, born in London, 29th August 1794, worked as a missionary in the South Sea Islands from 1816 to 1824, when he returned to London. He was Foreign Secretary of the London Missionary Society from 1838 to 1840. In 1853 he visited Madagascar to examine the state of Christianity there. The results of this journey were embodied in his *Three Visits to Madagascar*, 1853-56, *with Notices of the People, Natural History, &c* (1859), an excellent work, from which our knowledge of Madagascar has been mainly derived. His other works are—*Narrative of a Tour through Owhyhee* (1826); *Polynesian Researches* (1829); *History of Madagascar* (1839); *Vindication of the South Sea Missions* (1831); and *Madagascar Revisited* (1867). E. died June 9, 1872.—**Sarah Stickney E.**, born about 1800, married William E. in 1837. She is the authoress of many well-known works, among which are *Women of England* (1838); *Daughters of England* (1842); *Wives of England* (1843); *Hearts and Homes* (1848); *Mothers of Great Men* (1859); and several tales, *The Sons of the Soil, Family Secrets*, &c.—**Alexander John E.**, whose original name of Sharpe was changed by royal licence in 1825, was born at Hoxton, June 14, 1814. He was educated at Cambridge, and entered the Middle Temple, but never practised as a lawyer. He was made an F.R.S. in 1864, and was president of the Philological Society in 1872-74. Among his works are—*Alphabet of Nature* (1845); *Essentials of Phonetics* (1848); *Universal Writing and Printing* (1856); *Early English Pronunciation, with Especial Reference to Chaucer and Shakespeare* (1869-75); *Algebra identified with Geometry* (1874), &c. See PHONETIC WRITING.

Ello'ra, a decayed city of India, in Hyderabad, 13 miles N.W. from Aurungabad, and 170 E. of Bombay. It is encircled by a ruined wall, but is now a mere village, famous only for its rock-cut caves and temples. These are excavated in the side of a hill of red granite, and are of two distinct kinds—caves proper, and temples hewn out of the solid rock. The former are of Buddhist origin; the latter were made, in a later age, by the followers of the Jain and Brahmanical religions, and are among the most stupendous productions of man. Of the caves, the most celebrated is the Viswakarma Chaitya, or assembly hall, which is 85 feet long by 43 feet wide. The façade is less elaborately ornamented than in other cases; the roof is curved, and supported by twenty-eight octagonal pillars; at the end is a colossal sitting statue of Buddha. There are numerous *viharas*, or Buddhist monasteries, of which by far the largest is 110 feet by 70. These are all caves proper, and their excavation is placed by Fergusson at about 600 A.D. One of them has Brahmanical sculptures. The rock-cut temples are monolithic, and hewn entirely out of the hill, 'the rock having been cut away externally as well as internally;' each temple looking as if it had been placed in a pit. In the case of the Hylas, the most magnificent of these structures, the pit was dug in the sloping side of the hill, 100 feet deep, 150 wide, and 270 long. In the centre was left standing a block forming the temple, from 80 to 90 feet high. All round is a peristylar cloister, covered with carved objects from the Hindu pantheon. The temple itself is covered with carved and sculptured figures. There is no inscription or other date. It has been assigned to about 800 A.D., allowing for the excavation from thirty to fifty years. It was the work of a Dravidian people, and was dedicated to Siva. A second temple, the Dhumnar Lena, at the corner of the hill, 150 feet square, is so excavated that light is admitted from three sides, while the fourth side is part of the solid rock. The Jain rock-chambers have gateways and detached shrines. Of these the two finest are the Indra Subha and Jaganath Subha, which probably date from 750 A.D. See Fergusson's *History of Indian Architecture* (Lond. 1876).

Ellore', a town of British India, province of Madras, on the Jummulair, 38 miles N. of Masulipatam. It has manufactures of carpets and leather, was formerly an important military station, and is connected by an aqueduct with the Kistna Canal, but has a bad climate. Pop. (1871) 25,487.

Ells'worth, a port in Maine, on the Union river, 2 miles from its mouth, and 30 miles S.E. of Bangor. It has considerable shipbuilding, and an active wood-trade. Pop. (1870) 5257.

Ell'wood, Thomas, a Quaker writer, born at Crowell, Oxfordshire, in 1639, now remembered for his relations with Milton, to whom he became reader in 1661. In 1665 he visited Milton at Chalfont, St Giles, Buckinghamshire, and the poet gave him the MS. of *Paradise Lost*, asking him to criticise and return it. E. tells us he read the poem, and took it back to Milton:—'He asked how I liked it and what I thought of it, which I modestly but freely told him; and after some further discourse about it, I pleasantly said to him, "Thou hast said much here of paradise lost; but what hast thou to say of paradise found?" Milton, says E., sat some time musing, then changed the subject, but on E. visiting him after the Great Plague, he showed him *Paradise Regained*, and said, "This is owing to you; for you put it into my head by the question you put to me at Chalfont, which before I had not thought of.' E. died in 1713. See his *Autobiography* (2d ed. 1714).

Elm (Old Eng. *ellm*, Dut. *olm*, Swed. and Dan. *alm*, Comp. Lat. *ulmus*), a genus of Exogenous plants typical of the natural order *Ulmaceæ*, in which the leaves are alternate stipulate, with unisexual flowers borne in loose clusters. The perianth is inferior, irregular, and bell-shaped. The stamens are definite, and are attached to the base of the perianth. The ovary is one or two celled, and the fruit is dry or drupaceous. The seed is solitary, with little or no albumen. The genus *Ulmus* has a two-celled ovary and anatropal ovules, whilst the fruit is a *samara* and possesses winged appendages. The English E. (*U. campestris*) has small elliptic leaves. The flowers are subsessile. This tree grows in all parts of Europe, and affords a hard durable wood, much used by wheelwrights and shipbuilders. Its bark yields a dye, and is used in sugar-refining. Of the galls found in E. leaves in S. Europe is made E. balsam, a substance formerly much used in eye-diseases. The *U. montana* (wych or Scotch E) has large leaves, and grows quickly. The cork-barked E. (*U. suberosa*) is doubtfully regarded as a distinct species from the *U. campestris*. It is common in English plantations. Other species are the *U. major*, or Dutch cork-barked E, the smooth-leaved E. (*U. glabra*), the Cornish E. (*U. stricta*), the American white E. (*U. Americana*), and the slippery E. (*U. fulva*) of America. The winged E. (*U. alata*) of N. America has its branches provided on each side with corky appendages. *U. Chinensis* affords galls from its leaves, which are much used by the Chinese for dyeing and tanning leather.

Elmi'na ('the mine'), a fortified seaport on the Gold Coast, W. Africa, formerly the capital of the Dutch possessions, 10 miles W. of Cape Coast Castle. It is defended by Fort St George, one of the oldest as well as strongest of the coast forts. Pop. 8000. E. was founded by the Portuguese under the name São Jorge da Mina in 1481, and was taken by the Dutch in 1637. It was ceded with the rest of the Dutch possessions in Guinea to the British, April 6, 1872. During the Ashanti war it was destroyed by the English (1873).

Elmi'ra, a city of New York state, on the Chemung river, 274 miles N.W. by W. of New York. It stands in a fertile district, and possesses a fine court-house, a well-endowed female college, a state reformatory, and nineteen churches. There are large iron-foundries, manufactories of machinery, wool, boots and shoes, &c. The trade is large, and the town rising greatly. Pop. (1870) 15,873.

El'mo's Fire, St, a popular name of the electric brush sometimes seen round the top of masts or other pointed objects during a thunder-storm. The phenomenon, which is accompanied by a hissing noise, is supposed to indicate that the storm is nearly over. By the ancients it was called Castor and Pollux if the appearance were double, or Helena if single. In the latter case it was generally regarded as an evil omen.

Elms'horn, a town of Prussia, province of Slesvig-Holstein, on both banks of the Krückau, 18½ miles N.W. of Hamburg by railway. The principal industries are shipping, tanning, and shoemaking. There are also brandy-distilleries, breweries, and manufactures of tobacco, paper, chocolate, straw hats, cement, &c. Pop. (1871) 4829. The Swedes under Wrangel gained a victory here over the Danes, 15th February 1645.

El Obeid', or **Lobeid'**, the capital of Kordofan, lies in the heart of the country, at the N.W. base of the Djebel-Kordofan, 220 miles S.W. of Khartum. It is built chiefly of clay and straw, and the houses are scattered over a wide area. There is a large trade in gums, gold, ostrich-feathers, &c. Pop. about 12,000.

Elocu'tion (Lat. *elocutio*, 'speaking out'), expression in words rendered vivid and impressive by suitable look, accent, modulation, and gesture or action. In ancient times E. was carefully studied as one of the most important elements of oratory. In our own time a simpler taste allows only a minor place to E. in public speaking; and while the art still flourishes on the stage, and in some degree in the lecture-room, it is paid but little attention to in Parliament or in our pulpits or law-courts.

Éloge' (Gr. *eulogia*, Lat. *elogium*, 'praise'), a term denoting eulogy, applied in France to a panegyric or funeral oration regularly pronounced in honour of members of the Academy. The E. reached its greatest perfection in the days of Fontenelle, whose elegant *Éloges des Académiciens* fill two volumes (Par. 1731). It is now a common tribute at the grave of any person of eminence, and sometimes furnishes an opportunity for the expression of political sentiments. Occasionally the E. is in Latin, as in Ruhnken's famous *Elogium Hemsterhusii*. See Thomas, *Essai sur les Éloges*.

El'ohim (sing. Eloah, Arab. *Ilâh*, Syr. *Alôh*, 'power,' 'might'), the Hebrew word meaning *gods* (Micah iii. 7), is also applied to the one God of Israel (Amos iv. 2). The history of the Hebrew nation clearly indicates that their purer conception of God arose from an early polytheistic worship. Joshua (xxiv. 2) accuses the forefathers of the Hebrews of serving other gods beyond the Euphrates. In the time of Moses, Jehovah (properly Yahveh) was acknowledged as the national deity. By the prophets the name E. was certainly applied to the *one* God Jehovah, as if he were to them all that the plural could be, but the older name belonging to the polytheistic period was also retained, and in the opinion of many scholars the occurrence of E. in one of the accounts of creation in Genesis, and of Jehovah in the other, marks a difference in the antiquity and even in the origin of the tradition. This point, however, is still keenly disputed by rival schools of theology and biblical criticism.

Elonga'tion, Angle of, an astronomical term originally applied to the angular distance between two heavenly bodies, but now generally restricted to that distance between a planet and the sun, or a satellite and its planet.

Elope'ment. See ABDUCTION.

El Pa'so del Nor'té ('the north pass'), a fertile valley of Mexico, in the state of Chihuahua, extends a distance of 10 miles along the right bank of the Rio Grande, and is the thoroughfare leading northward out of the republic into the state of New Mexico. Pop. about 5000, much engaged in the vine culture, and in the manufacture of a celebrated wine and brandy.

El'phinstone, Mountstu'art, an East Indian statesman and administrator, the fourth son of the eleventh Baron E., was born at Edinburgh in 1779. He entered the East India Company as a cadet (1796), and after some diplomatic service under the Duke of Wellington was nominated first envoy to Cabul in 1808. On the apprehension of a Franco-Russian invasion of British India he concluded a treaty of alliance with Shah Sujah, which was the first step in our eventful relation to Afghan affairs. He published an *Account of the Kingdom of Cabul* (Lond. 1815, 3d ed. 1842). In 1816 he took up residence at the court of the Peishwa, and in 1817 was actively engaged in the battle of Kirkee—the deathblow of the Mahratta power. He was governor of Bombay from 1820 to 1827, and his rule was marked by great public works and vast reforms, and was crowned by the enactment of 'the E. Code,' which, for comprehensive clearness and brevity, is comparable to the *Code Napoleon*. The E. College in Bombay was founded in his honour (1827). On his return to Europe he devoted his leisure to his *History of India, the Hindu and Mohammedan Periods* (2 vols. Lond. 1841, 4th ed. 1864), a work which has gained him the title of the Tacitus of Indian history. He died at his estate of Hookward, in Surrey, 20th November 1859. See Colebrooke's *Memoir of E.* (Lond. 1861), and Sir J. W. Kaye's *Lives of Indian Officers* (Lond. 1867).

Elphinstone, William, one of the most enlightened of Scotch ecclesiastics and statesmen of the 15th and 16th centuries, was born about 1430. He was the illegitimate son of William E., Archdeacon of Teviotdale. Trained at Glasgow for the Church, he showed a strong liking for law, which he studied on the Continent to such purpose that he obtained a professorship in the University of Paris, and afterwards in that of Orleans. Returning to Scotland about his thirty-ninth year, he threw himself into ecclesiastical and diplomatic life, held in succession the offices of official-general of Glasgow diocese, Rector of the University and official of Lothian, and, under James III. and James IV., Chancellor of the kingdom of Scotland, and Keeper of the Privy Council. This last office he held from 1500 to his death, October 25, 1514. His chief ecclesiastical offices were those of Bishop of Ross (1481), and of Aberdeen (1483), and no prelate of his country or time had so high a reputation for devotion to his church, erudition, or sagacity. Employed on various embassies, he was a strenuous advocate of an alliance between Scotland and France. Such was his patriotism that the defeat of Flodden is believed to have hastened his death. He aided in establishing the first Scotch printing-press (that of Millar and Chepman) in Scotland (1509–10), and in causing to be printed the *Breviarium Aberdonense* (reprinted in 1853), in which he wrote the lives of Scottish fathers. E. will be remembered chiefly for having obtained from Pope Alexander VI. a bull for the establishment of a college in Aberdeen, otherwise largely benefited by him, which was founded in 1500. Originally St Mary's College, it has since become known as King's College, and is now merged with Marischal College in the University of Aberdeen. See Cosmo Innes's *Sketches of Early Scottish History* (Edinb. 1861).

El Rosar'io, a town of Mexico, state of Cinaloa, 55 miles E. of Mazatlan, has some trade with the interior, and was formerly noted for its now abandoned gold-mines. Pop. 5000.

El'sass-Loth'ringen, the German form of Alsace-Lorraine (q. v.).

Elsinore' (Dan. *Helsingör*, formerly *Krogen*), a picturesque old seaport of Denmark, on the island of Seeland, and on the W. shore of the Sound, 24 miles N. by E. of Copenhagen by railway. It has a cathedral, a beautiful royal palace (*Marienlyst*), a large custom-house, &c., and is defended by the castle of Kronborg (1574–84), which commands the Sound from a promontory. The Sound is here only 2½ miles broad, and is frozen over in exceptionally severe winters. E. has a good harbour and active manufactures of hosiery, arms, and brandy. In 1873 there passed through the Sound 5946 vessels, most of which anchored at E. for provisions. Here were formerly collected the Sound dues. Pop. (1870) 8891. E. is the birthplace of Saxo Grammaticus and the scene of Shakespeare's *Hamlet*.

Els'ter ('the alder-tree stream'), **the Black**, a river in Saxony, rises near Hernhut, flows N.W., and joins the Elbe 8 miles E. of Wittenberg, after a course of 111 miles.—**The White E.** rises on the N.W. frontier of Bohemia, flows N., and joins the Saale 3 miles S. of Halle, after a course of 120 miles.

Els'tracke, Reginald, an accomplished English engraver of the early part of the 17th c., whose works, chiefly portraits, have a high character for firmness and vigour. They are extremely rare, and are much sought after, not only for their artistic merit, but also for their historical value.

El'ton, Lake, a salt lake of Russia, on the border of the Khirghiz Steppes, in the government of Samara, and 90 miles E.N.E. of the point at which the Volga bends S.E. to the Caspian Sea. It is 14 miles long, has an area of 78 sq. miles, but is exceedingly shallow. It yields some 6,000,000 cwt. of salt yearly. The industry employs 10,000 people. All the salt is conveyed for shipment to Kamyschin, on the Volga.

Elutria'tion (Lat. *elutriatus*, 'washed out'), a process of washing with water employed in the laboratory and in several arts for separating the lighter from the heavier particles of disintegrated mineral matter. After the large heavy particles subside, and while the lighter particles are held in suspension, the water is drawn off. E. is usually performed in a vat provided with grinding wheels, as in the case of ores, potter's-clay, and pigments.

El'vas (anc. *Alba*, from the Basque *Alboa*, 'the place on the rugged hill'), a fortified town and bishop's see in the fortress of Alemtejo, Portugal, on a steep hill overlooking a tributary of the Cayo, near the Spanish frontier, and 12 miles W. of Badajoz. The streets are crooked and filthy, but many Moorish houses, with their latticed windows and verandahs, give the town a picturesque appearance. The fortress, the strongest in Portugal, was built by the Moors, and was unsuccessfully besieged by the Spaniards in 1658 and 1711. The cathedral is of mixed Arabesque and Gothic. E. has also a college, an arsenal, a hospital, a theatre, &c. A supply of water is provided by a Moorish aqueduct (*Os Arcos de Amoreiro*), which rises in several tiers of arches to a height of 250 feet, and has a length of 3¼ miles. The inhabitants carry on a profitable smuggling trade with Spain, especially in British fabrics. Pop. 12,400. The neighbourhood is rich in wine, oil, and fruits.

Ely (Old Eng. '*Elig*, 'Eel town'), a cathedral city in Cambridgeshire, 72½ miles N.N.E. of London and 15 N.E. of Cambridge by railway. It stands on slightly elevated ground on the left bank of the Ouse, and in the midst of a country exceedingly fertile, producing large quantities of fruit and vegetables (chiefly asparagus) for the London market. Pop. of the 'city,' embracing the three parishes of Holy Trinity, St Mary, and E. College (1871), 8166. Of the parish churches, St Mary's is partly Norman partly Early English. There are two railway stations—those of the Eastern Counties and Great Northern Railways. But the importance and the renown of E. lies in its famous cathedral, founded by Simeon, the first Norman abbot (1082–94) of the monastery established (970) on the site of the former convent of St Ætheldrida, daughter of Anna, king of the East Anglians. The building was completed to its western end, and the first tower nearly to the summit, in the time of Bishop Riddell (1174–89). The Galilee or western porch was built 1198–1215. In the time of William of Wykeham it had a choir and a presbytery added to it, which raised it to the very first rank among English churches; and when its old Norman tower fell in 1322, the famous octagon, at the intersection of the nave and transepts, was built by Alan of Walsingham. This octagon, 70 feet by 65, is, according to Fergusson, the only true Gothic dome in existence. It is unsurpassed in beauty by any similar structure in Gothic architecture. All the styles of architecture from Early Norman to Late Perpendicular may here be studied. The nave is Norman, the presbytery belongs to the 13th, and the octagon and choir to the 14th c. The cathedral measures 565 feet from western to eastern exterior, and is the largest church in Europe, having an area of 61,700 feet. The height of the central tower is 215 feet, while the nave is 72 feet high and 75 wide. It is built throughout of stone from Barnack in Northamptonshire, but many of the interior shafts and pinnacles are worked in Purbeck marble. Among the famous ecclesiastics that ruled in E. cathedral were Abbot Theorstan, who espoused the cause of Eadgar the Ætheling, and successfully held the Isle of E. against the Normans for several years; Simeon, the brother of Walkelin, Bishop of Winchester, and a relative of the Conqueror; Longchamp, the Grand Justiciary of Richard I.; Louis de Luxemburg, who had been Chancellor of France and Normandy for Henry VI.; and Stanley, third son of the first Earl of Derby. Quite recently the cathedral has been restored under the superintendence of Sir G. G. Scott, at the cost of £45,000.

Ely, Isle of (Old Eng. *Eligea*, 'Island of eels'), the Cambridgeshire Fens, or the N. portion of Cambridgeshire, from the rest of which it is cut off by the Ouse. Area, 227,326 acres; pop. (1871) 66,333. The fen lands, formerly sour from excess of moisture, and producing nothing but reeds and sedge, are now rich and productive in cereals and vegetables. They are protected from inundation by artificial banks along the rivers. Formerly windmills were used to work the machinery by which water was removed from the flats into the streams, but recently these have partly given place to steam-engines.

Ely, County of, is only a royal franchise, and not a county-palatine, though sometimes improperly so considered. See COUNTY.

El'ymus, a genus of Gramineæ (q. v.) or Grasses.

Elys'ium (Gr. *ēlusion*), in Greek mythology the abode of the blessed after death. Homer (Od. iv. 563 *seq.*) places it on the W. border of the earth near to Ocean, and represents its hero-tenants as living in ease and plenty under the mild rule of the golden-haired Rhadamanthus. Elsewhere (Od. xi. 490 *seq.*) he gives a gloomier description of the spirit-land, and makes Achilles say that he would rather be the veriest drudge on earth than king of the shades. Hesiod and Pindar place E. in the Islands of the Blest. The Latin poets regard it as a part of the nether world, and paint it as a delicious region of verdant fields, amaranthine meadows, perennial streams, and shady groves.

Elzevier', or **Elzevir**, the name of a Dutch family who for 130 years were engaged in the business of bookselling and printing, and whose name is identified with accurate and beautiful typography. The first was Lodewijk E., born at Louvain, who started business at Leyden in 1580. His *Eutropius* appeared in 1592, and before 1617 he had published 150 works. His five sons all followed the same trade: Mattheus at Leyden, Ægidius at the Hague, Bonaventura, who in partnership with his nephew Abraham (specially a printer) at Leyden for twenty-six years produced small but beautiful editions of the classics, and the famous *Les Petites Républiques*. The Amsterdam printing house was started in 1638 by Lodewijk of the third generation; he before 1654 had produced 189 works, chiefly 8vo classics, *Cicero* in 4to, *Corpus Juris*, folio, and the *Etymologicon Linguæ Latinæ*. Lodewijk was afterwards joined by Daniel, the son of Bonaventura, who had previously, in partnership with his cousin Jan at Leyden, produced about 30 works, and afterwards, when alone, 118 works, including the 4to *Homer*, Heinsius' edition of *Ovid*, and the New Testament. At Amsterdam Daniel, who lived till 1680, had produced about 152 additional works. Pieter, a bookseller at Utrecht, and Abraham II., who did University printing at Leyden down to 1712, were the last of the family. In 1820 a descendant was governor of Curaçoa. Of the total 1213 Elzevirs, 968 are Latin, 44 Greek, 126 French, 32 Flemish, 11 German, 10 Italian, 22 in Eastern languages. Only one, Heinsius' *De Contemptu Mortis*, is on vellum. Among the 8vos, the most prized are *Pliny* (1635), *Virgil* (1636); *The Imitation of Christ*, *Livy*, *Cæsar*, and *Tacitus* were also masterpieces. Among French works *Comines* and the *Sagesse* of Charron may be mentioned. The *Seneca* is valued as being unbound and showing the original margin. The best lists of Elzevirs are to be found in Brunet's *Manuel du Libraire*. Didot, Nodier, Mottely, Pieters, Bérard, Walther, and De Beaume have written special works on the subject. Elzevirs are with difficulty distinguished, the E. name having been stolen by other printers, and the Elzevirs having issued many anonymous works to escape political or religious censure. There are also close copies by eminent printers like Foppens of Brussels and Wolfgang of Leyden. At one time every book printed in Holland in the 17th c. and marked with a sphere was cherished as an E. The reliable marks are these:—(1) An eagle bearing seven arrows with the motto *Concordia res parvæ crescunt*; (2) a column surrounded by a vine branch, with a philosopher below and the motto *Non solus*; (3) Minerva and an olive-tree, *Ne extra oleas*; (4) a burning pile of wood, *Apud Elzevirios* (in allusion to the name E., which means elm or fire-wood), or *Ex officina E.* also appears. The paper came chiefly from Angou-

lème; the types were, many of them, cut and cast by Garamond and Sanlecque. The Elzevirs were more successful men of business than the older printers, such as the Aldi, Morel, Amerbach, &c., but probably had not the same literary enthusiasm.

Emana'tion, Doctrine of, was the hypothesis by which Plotinus surmounted the dilemma that if God produced a world, as it could not be produced from nothing, it must be produced from God's substance, and was therefore identical with God; or from some other substance, which was therefore contemporaneous with God. The Christian said creation took place by an omnipotent volition, but Plotinus said the world was the mere emanation of the absolute unity into intelligence, and of intelligence into the universal soul. Emanation thus excludes dualism and even pantheism, for though the world is God, God is not the world. There was also a process of reabsorption of the finite into the infinite existence. Intimations of this change are received from time to time through Ecstasy (q. v.). God is also described as Bŭthos, or Abyss of Being. The successive attenuations of the divine substance, æons or ideas, are described as expanding rays of light. The sum of these æons is *plērōma*, and the last æon, *sophia*, passing into the void (*kenōma*), produces the world.

Emancipa'tion (Lat. *emancipo*, 'I liberate or declare to be free, not a chattel or piece of property') is the act of freeing from any subjection or disability. See CATHOLIC EMANCIPATION and SLAVERY.

Emancipation is a term borrowed from the Roman law, denoting in Scotch law the liberation of a child from paternal authority. See FORISFAMILIATION, PARENT AND CHILD.

Eman'uel I., King of Portugal, was born 3d May 1469, and succeeded João II. in 1495. His reign is the most glorious in the Portuguese annals. He reformed education, patronised art and literature, and codified the Portuguese laws; but he is especially memorable as the energetic promoter of his country's commerce and naval power. In his reign Vasco de Gama sailed round the Cape of Good Hope to India, Cabral took possession of Brazil, Lope de Soares opened up the China trade, and Almeida and Albuquerque extended the Portuguese power in India and on the E. coast of Africa. His reign is the beginning of what is called the *Golden Period of Portuguese History*, which extends from 1495 to 1580. E. made Lisbon the chief seat of commerce in Europe. The only severe reverse which he sustained was in Northern Africa. He was variously styled the Good, the Great, and the Fortunate. Thrice married, his last wife was sister of Karl V. of Austria. He died 13th December 1521.

Embalm'ing (Fr. *embaumement*, from *baume*; Old Fr. *bausme*, Lat. *balsamum*), the art of preserving dead bodies by employing antiseptic drugs, aromatic, saline, tanning, or other chemical reagents. In Ancient Egypt the art attained a high state of perfection, and bodies, called 'mummies' (from the Arabic *mumia*, 'bitumen,' or *mum*, 'wax'), embalmed in that country thousands of years ago are still in a fair state of preservation. Probably the oldest human relic in the world, the mummy of King Mycerinus, builder of the third pyramid, is now in the British Museum. E. was universal among the Egyptians, and the custom has been ascribed to their belief that an undecayed body would be reanimated after a lapse of 3000 years. Wilkinson, however, thinks 'the custom arose rather from a sanitary regulation for the benefit of the living, and from that feeling of respect for the dead which is common to all men.' Herodotus describes three methods that were pursued in Egypt, each differing in details and costliness. The corpses of the rich were embalmed in a most elaborate and magnificent style. The brains were extracted through the nostrils with curved instruments, and the viscera through an incision in the left side, and drugs and powdered aromatics inserted into the cavities. The wound in the side was then closed, and the body kept in natron for seventy days, and after that time it was swathed in fine linen bands smeared with gum. In some instances the face and other parts of the body were gilded. The other two processes were similar but less expensive. It would appear that there were other modes of E. than those mentioned by the Greek historian, for mummies have been found in which bitumen has been the chief preservative. A modern classification of Egyptian modes of E. is given in Pettigrew's *History of Egyptian Mummies* (Lond., 1834). The embalmed bodies of the rich were enclosed in two coffins of sycamore or cedar wood, painted with hieroglyphic legends. Those of the poor were wrapped in sheets and laid in mummy pits. The bodies of sacred animals were also embalmed by the Egyptians. Other nations, including the Jews, Greeks, and Romans, practised the art of E., but less effectively than the Egyptians. Large numbers of mummies, chiefly preserved by desiccation, have been discovered in Peru. The Aztecs, and others of the extinct tribes of Central America, also occasionally preserved their dead (Bancroft's *Native Races of the Pacific States of N. America*, Lond. 1875). Many caverns, containing Guanche mummies, generally in a good state of preservation, have been opened in Teneriffe. The Guanches, the aboriginal inhabitants of the Canary Islands, disembowelled the corpse, washed it with a saline solution, anointed it with a composition of sheep's butter, powdered pumice-stone and pinetree dust, and dried it in the sun for fifteen days (*Ethnological Society Transactions*, new series, vol. vii.). E. has been studied scientifically in modern times. During last century Lewis de Bil, Clauderus, and Benjamin Gooch operated with varying success, and two bodies preserved in the Royal College of Surgeons show the efficacy of Dr John Hunter's injection method. In one of these camphorated spirits of wine was thrown into the arteries and veins. An arsenical solution was used by Dr Tranchina of Naples and by M. Gaunal of Paris. The latter subsequently adopted a solution of sulphate and chloride of aluminium, and a chloride of zinc solution was employed by Dr Souquet. The Parisian Academy of Medicine tested, in 1847, the processes of Gaunal and Souquet, with the result that the mode of the latter was alone successful. M. Audigier's method of E. is at present adopted in Paris. It consists in pouring a preserving liquid into the larynx through the mouth, and in surrounding the corpse with a vegetable powder saturated with the same liquid. The body, it is said, acquires a wooden hardness. In America Dr Seely resorts to carbolic acid, and in England Dr W. B. Richardson uses conjunctly three solutions. A saturated solution of zincic chloride is injected slowly into the tracheal or femoral artery, which is afterwards plugged with silicate of soda. Zinc colloid is then introduced into the brain and abdomen, the nose is stuffed with cotton and wool, and the eyelids and lips drawn together. While it is impossible to say whether these processes of E. will stand the test of time, it would be unreasonable to assert that chemical research is unable to furnish a preservative as efficient as the preparations of the Egyptians. Modern E., however, should be regarded as a scientific curiosity, for it is unlikely that the art will ever be revived widely.

Embank'ment. See EARTHWORK.

Embar'go (Span. 'arrest or impediment') is a detention or arrest of ships or merchandise by public authority. On breaking out of war, an E. may be imposed on the shipping of the enemy by proclamation. An E. has not the effect of putting an end to the contract of affreightment, the freight being due as if the ship were detained by contrary winds. The master and the crew are consequently entitled to wages during detention.

Em'bassy (Med. Lat. *ambactia* or *ambavia*, 'service or charge,' from a Celtic word Latinised into *ambactus*, 'retainer,' or the Gothic *andbahts*), a diplomatic mission, the function of an ambassador. The Romans had their *legatus*, 'a delegate,' whence this branch of international law is known as *jus legatorum*, and the rights of E. are called *jus legationis*. A sovereign, the head of a department, or a military officer may act on E. without having the title of an ambassador. Lord Coke says of Henry VII. that he would not suffer any foreign ambassador within his realm; and in Poland, in the 17th c., one who did not depart after his business was over was thought to be a spy. Whether any state of a confederation can send ambassadors depends on the federal compact: neither the American nor the Swiss states can do so. Generally, no objection to religion, rank, or sex of an ambassador can be taken. Madame Guelriant was French ambassador at the Polish court in 1646. The rank of ambassador was fixed at the Congress of Vienna, March 19, 1815. Diplomatic employés are divided into (1) ambassadors, legates or nuncios; (2) envoys, ministers, or others accredited to sovereigns; (3) chargés d'affaires accredited to foreign ministers. The office of ambassador is terminated by the death of either sovereign. See AMBASSADOR.

Embatt'led, or **Battled,** in heraldry, the partition line across the shield in representation of battlements. This 'difference' was often conferred for distinction in battle.

Embatt'lement. See BATTLEMENT.

Emberi'za and **Emberizida.** See BUNTING.

Embezz'lement is the fraudulent appropriation of the property of another by the person to whom it is intrusted. At common law this offence does not amount to theft, but is punishable arbitrarily as malversation or Breach of Trust (q. v.). It has, however, been found necessary to enact statutes for the punishment of E. in certain cases. E. is not cheating, because there is no fraudulent contrivance, nor is any false pretence used. Neither is it theft, because no property is taken, the offender being previously in lawful possession; but the line between theft and E. is often very difficult to draw. Thus the appropriation by a watchmaker of a watch left with him to be cleaned and repaired was held to be *theft*, beause, as the judge said, 'when a party puts his watch into the hands of a watchmaker to be cleaned or repaired, he only parts with the *custody;* the *possession* of the watch is the possession of the owner.' The range of punishment extends from fine or imprisonment to transportation for life. By statute, any one employed in the Post Office who steals a letter is liable to transportation for seven years, and if the letter contain money or valuables, to transportation for life. A clerk or servant guilty of E. may be transported for fourteen years. Any agent receiving money with written instruction as to its application converting the same to his own use is liable to penal servitude for seven years. A member of a copartnership who converts the common property to his own use is liable to be tried and punished as if he had not been a member of the copartnership. E. of Government stores is punishable by penal servitude for fourteen years. See BROAD ARROW.

Embla'zon. See BLAZON.

Em'blem (Gr. *emblēma*, 'something inserted;' *en*, 'in,' and *ballein*, 'to throw'), a concrete or pictorial expression of a symbolical idea. Thus the lion is the E. of courage. Among the sacred emblems in heraldry are the winged lion of St Mark, the angel of St Matthew, the winged ox of St Luke, and the eagle of St John. The red rose, the white rose, and the violet have served respectively as the emblems of the houses of Lancaster, Stuart, and Bonaparte.

Em'blements, a term of English law denoting the profits of land sold, but the word is sometimes used to denote any natural fruits of the ground. A tenant, or another in his right, is in all cases entitled to reap the crop which he has sown. On the death of a tenant, the executor, and not the heir, is entitled to the E. See APPORTIONMENT, LIFERENT.

Em'blica, a genus of *Euphorbiaceæ*, of which the only species is the *E. officinalis* or *Phyllanthus E.* It is a native of India and the Malay Archipelago. Its acrid fruit is used in India as a pickle. The dry ripe fruit is a medicine for diarrhœa, dysentery, and cholera, and is known as *Myrobalani emblici.* The bark is used for tanning and as a black dye.

Em'bolism (from the Gr. *emballō*, 'I throw in') in medicine denotes the presence of obstructing clots of blood in the vessels. E. often causes obscure disease and sudden death, especially if it occurs in the large arteries near the heart. Women in childbed are liable to E., and several cases of the kind are given in Simpson's *Obstetric Memoirs.* See Cohn's *Ueber Embolischen Krankheiten.*

Emboss'ing (Fr. *bosse*, 'a swelling or hump'), the art of producing raised patterns or ornaments on any plane surface of paper, cardboard, cloth, leather, wood, &c. Metal patterns are produced by E. or 'stamping.' In the E. of paper a die with the pattern is first prepared, and a counter-die either in metal or cardboard is made. The dies are fixed in a press, and the paper or cardboard is well damped before E. For the E. of names, monograms, and crests, steel dies and counter-dies are engraved, and E. and colour-printing are required for the printing of such in colours. The E. of cloth, such as velvet, felted table-covers, &c., is done by a cylinder machine, which is a modified form of calender. A colour-printing apparatus is also used, as in calico-printing. The pattern for E. is engraved on one roller, and either counter-sunk on that opposed to it, or the opposing roller is covered with a yielding surface-thickness of felt. Wall papers are embossed on such cylinder machines. The E. of leather has long been practised, and bold designs are easily produced in that material when it is thoroughly softened by water. There are several methods for producing raised patterns on wood otherwise than by carving, and these may be regarded as modified forms of E. One method applicable to soft wood is to produce the outline of the required pattern by powerful pressure, which sinks and compresses the fibres. The wood being planed level and steeped in water, the previously compressed portion which has escaped the plane expands, and the pattern is produced in relief. Another plan, which may be adopted with hard wood, is to apply a mould containing the pattern red hot to the wet surface. A superficial charring takes place, and repeated wettings and burnings are all that is necessary to procure patterns.

Em'bouchure (Fr.), a mouth or opening, as the mouth of a river. In music it means the part of a wind instrument to which the mouth is applied in blowing.

Embowed', in heraldry, means curved or bent. The left arm bent at the elbow is blazoned 'embowed,' the right arm 'counter-embowed.' The word was formerly in general use in English, as in *Il Penseroso*, 'And love the high embowèd roof,' and in Spenser's *Visions of the World's Vanity*, 'Embowed like the moon.'

Embra'cery, in English law, signifies an attempt to influence a jury in their verdict by persuasion or bribery. The embraceor and guilty juror are liable to imprisonment and fine.

Embra'zures are openings for cannon in fortified works or in siege batteries. E., which have an outward slope to allow of free firing, secure the safety of those within the walls.

Embroca'tion (through Low Latin from the Gr. *embrechō*, 'I soak in') denotes the incessant moistening with certain applications, and rubbing of a diseased part, as a means of cure.

Embroi'dery (Fr. *broderie*, a doublet of 'bordering'), decorative work wrought with the needle upon any textile fabric. The art reaches back into prehistoric times. Embroidered patterns are seen upon the garments of persons represented on Egyptian monuments, and from the Book of Exodus we gather that the Israelites acquired the art while dwelling in Egypt. Babylon had a wide-spread reputation for the beauty of her E.; and in Phrygia, Greece, and Rome the art was also carried to perfection. During the middle ages nuns, and even monks, and women of royal and noble rank, engaged in it. Some ecclesiastical vestments of that time display gorgeous E. in gold, silver, and coloured silk, frequently enriched with precious stones. England was for several centuries celebrated for various styles of E., and during the 13th c. a new method was introduced which won the admiration of Christendom, and was designated *opus Anglicum.* In it the old feather-stitch (*opus plumarium*) was combined with a chain-stitch, which was laid down in circles for parts of the human face, and in straight lines for the rest of the figure, and an appearance of relief was given to the face by pressing some parts down with a heated instrument. The finest existing example of 'English work' is the Syon Cope, embroidered in gold, silver, and silks in the 13th c., and now treasured in the South Kensington Museum. About the same period was produced the misnamed Bayeux Tapestry (q. v.).

Modern E. may be divided into two classes—white E., worked upon muslin, cambric, &c.; and coloured E., as silk, worsted, gold, &c., worked on silk and other stuffs. France stands in the first rank for the production of white E., and then follow Saxony, Switzerland, and Italy. Glasgow was a great centre of this industry till the crisis of 1857. E. is applied to curtains, caps, collars, &c. In coloured E. China, Japan, and India especially excel, and rich work of the same kind is found on the dresses and common domestic articles of the Turks, Georgians, and Circassians. The vestments of the Russian hierarchy and Albanian costumes resemble tissues of gold and silver, so profusely are threads of these metals employed in their adornment. Artistically coloured E. has greatly declined in England, but there are signs of its revival. *Appliqué* work signifies that the

needlework has first been wrought upon some tissue, and afterwards sewn or *applied* to the embroidered stuff. It is common on mediæval velvets. Machines, chiefly modifications of Heilmann's invention, have recently come into use in England and on the Continent, by which elaborate patterns can be executed by one person, who may keep 130 needles in simultaneous motion. The work of fifteen hand-embroiderers is performed by one of these machines. Several sewing-machines have also been adapted to embroidering. See Dr Ure's *Dictionary of Arts, Manufactures, and Mines* (7th ed. Lond. 1875).

Embrun', an ancient town of France, in the department of Hautes-Alpes, on the right bank of the Durance, and on the side of Mont St Guillaume, about 100 miles N.N.E. of Marseille. Its cathedral, the construction of which is referred to the era of Karl the Great, is one of the finest historic buildings of France. E. manufactures cloth, silk, and velvet. Pop. (1872) 2161. E., the ancient *Ebrodunum*, is of Celtic origin, and is mentioned by Strabo. It was made the see of a bishop during the 4th c., and afterwards of an archbishop. It was ravaged successively by Vandals, Huns, Lombards, and Spanish Arabs. E. suffered greatly in the religious wars of the 16th c., and was partly destroyed by the Duke of Savoy under Louis XIV. (1692).

Em'bryo (Gr. *embruon*, 'budding inwardly,' from *en*, 'within,' and *bruein*, 'to swell like a bud'), the name given to the developing young of animals and plants in its earlier stages of growth. In botany the E. is the young plant contained in the seed. It is contained originally in the E.-sac, and appears to develop from a single nucleated cell. In the plant-E. the root and stem portions can usually be discerned, the former pointing to the micropyle or small aperture in the seed. Embryology or embryogeny is the science which deals with the Development of the E. (q. v.) in animals and plants. The name *fœtus* is frequently given to the E. of higher animals. The true E. results from fertilisation of the seed or egg respectively. See GENERATION, &c.

Embryol'ogy. See DEVELOPMENT OF THE EMBRYO.

Embryot'omy, in obstetrics, is the dividing of the fœtus *in utero*, in order to procure delivery. The operation is justifiable only when the size of the pelvis cavity renders delivery by other means impossible.

Em'den ('the fort on the Ems'), formerly **Embden**, a seaport of Prussia, in E. Friesland, on the N. shore of Dollart Bay, near the mouth of the Ems, 70 miles W.N.W. of Bremen by railway. It has a good harbour, and is intersected by several canals, which are crossed by some thirty bridges. The chief buildings are the townhouse (1574–76), an exchange, a custom-house, a school of navigation, a deaf and dumb asylum, and a museum of antiquities. E. has manufactures of linens, hosiery, sailcloth, starch, soap, tobacco, &c., and also extensive shipbuilding yards and breweries. The town, which lies low, is protected from inundation by dykes. Pop. (1872) 12,588. The free port of E. became Prussian in 1744, passed to Holland in 1806, to France in 1809, again to Prussia in 1814, and finally to Hanover in 1815.

Em'erald (Fr. *émeraude*, Old Fr. *esmeralde*, Sp. *esmerelda*, Ger. *smaragd*, from the Gr. *smaragdus*). This highly valued precious stone differs from the beryl and aquamarine only by the brilliant green colour which is its characteristic, and which some allege to be due to the presence of organic matter similar to the chlorophyll of leaves, while others ascribe it to a small proportion of chromium oxide. The precious E. crystallises in the hexagonal system; it is transparent, with a deep-green colour, without any admixture of blue or yellow; in hardness it exceeds quartz, and its specific gravity is 2·732. In percentage composition it consists of silica 68·50, alumina 15·75, glucina 12·50, with generally small proportions of iron, chromium, and lime. The largest emeralds are found in Siberia, on the Tokowoia, while the finest occur in S. America, especially at Muzo in Colombia. Other mines are at Canjargum in India, Limoges in France, Mount Zabarah in Upper Egypt, and the Hambach Valley in Salzburg. When first taken from the mine, the E. is so soft and friable that it can be reduced to powder by rubbing between the fingers, but it hardens by exposure to the air for a few days. The E. is esteemed in value next to the ruby, and from its supposed great virtues is especially treasured in the East. The Duke of Devonshire owns a fine American E. weighing 8 oz. 18 dwt., and in Mr Hope's collection there is another weighing 6 oz., for which its owner paid £500. The E. is often referred to in Scripture and by classical authors. Oriental E. is the name of a rare green variety of sapphire. E. copper, or dioptase, a green crystallised mineral found only in Central Asia, consists of 50 parts of protoxide of copper, 39 of silica, and 11 of water. E. nickel is a compound of carbonate and hydrate of nickel, found at the chrome-mines of Texas.

Emerald Hill, a town in Victoria forming one of the suburbs of Melbourne, but under distinct municipal government. It occupies very nearly the site of the 'Canvas Town' of the early days of Victorian gold-discovery. Pop. 19,500.

Emer'sion (Lat. *emergere*, 'to come forth'), in astronomy, is the reappearance of one heavenly body from behind another. *Immersion* is its disappearance at the commencement of the occultation or eclipse. Both phenomena are of great use in determining the Longitude (q. v.) of any locality.

Em'erson, Rev. William, a descendant of a chaplain in the Army of Independence, was born at Concord, Massachusetts, May 6, 1769, graduated at Harvard College in 1789, became minister of a Unitarian Church in Boston, published several discourses, a *Selection of Psalms and Hymns* (1808), and a *History of the First Church of Boston* (1812), and died May 12, 1811.—**Ralph Waldo E., LL.D.**, essayist and poet, son of the above, was born at Boston, May 25, 1803, graduated at Harvard College in 1821, became a Unitarian minister in Boston, but in 1823 abandoned preaching, and has since lived, chiefly at Concord, in seclusion and study. An oration, *Man Thinking*, before the Phi Beta Kappa Society, Cambridge, in 1837, and an address to the senior divinity class, Cambridge, won him wide notice for their daring and poetic transcendentalism. He produced *Literary Ethics*, an oration, in 1838; *Nature*, an essay, in 1839; in 1840 started the *Dial*, a transcendentalist organ, and in 1841 published *The Method of Nature*, *Man the Reformer*, *Lectures on the Times*, and the first series of his *Essays*. A second series of *Essays* appeared in 1844, and his first *Poems* in 1846. In 1848 he visited England, where he lectured on *The Mind and Manners of the 19th c.* In 1850 he issued *Representative Men*, and published, along with W. H. Channing, the *Memoirs of Margaret Fuller* (1852). Since then he has produced *English Traits* (1856), *Conduct of Life* (1860), *Oration on the Death of President Lincoln* (1865), *Mayday and other Pieces* (1867), *Society and Solitude* (1870), *Parnassus*, a collection of poems (1871), and *Letters and Social Aims* (1876). He was made LL.D. of Harvard College in 1866. Throughout his writings E. has sought to render life more spiritual and of a nobler moral tone, to lend it an ideal colouring without neglecting its practical needs. His works mingle a beautiful idealism with shrewd ethical teachings. In the nature of his admonitions, in the union of mystical speculation with fiery homely reproof of the age, he resembles Carlyle, but not at the expense of originality. His prose style is crisp, simple, and limpid, rich in words and phrases of singular suggestiveness and pregnancy. His poems lack melody and free lyrical impulse, and are sometimes rough in diction and cloudy in meaning, but embody much of the freshest and subtlest thought to be found in recent verse.

Em'ery (Fr. *émeri*, Old Fr. *esmeril*, Gr. *smuris*, from *smurizō*, 'I polish'), is the massive variety of the mineral species Corundum (q. v.), which includes also the sapphire, the Oriental ruby, the Oriental topaz, &c. E. has a dull-brown colour, and varies in hardness and specific gravity according to its degree of purity. Thus sapphire, which is practically pure crystallised alumina, is only exceeded in hardness by the diamond, and is the purest form of the mineral of which E. is a variety. The supply of E. for industrial purposes comes chiefly from Naxos, Nicaria, and Samos, where it is obtained in large boulders. It is also obtained near Gumuch-Dagh, about 12 miles E. of Ephesus, and in Massachusetts, U.S. E., on account of its hardness, is a substance very extensively employed in the arts. It is used in the grinding, cutting, or polishing of plate glass, flint glass, gems, jewels, edge-tools, brass, &c. It is prepared for use by pounding it under heavy steel stamping tools; and when sufficiently comminuted, it is arranged into sizes by sifting through sieves. Grinding wheels of a composition the essential ingredient of which is E. are in use. E. cloth is made by sifting the particles over a surface of calico prepared with dissolved glue.

E. dust is laid on the edge of iron and lead wheels for cutting and polishing in lapidary work.

Emet'ics (Gr. *emetikos*, from *emeō*), are substances which produce vomiting by a specific action on the stomach, independently of their odour, taste, or bulk. They should be administered in every case in which a poisonous or injurious substance has been swallowed. If medicinal E. are not at hand, vomiting may be induced by tickling the fauces with the finger or with a feather, or by copious draughts of tepid water. In slight disorders of the stomach E. afford relief, and in many acute internal diseases nausea is only removed by emesis, occurring naturally or by the administration of E. The occasional use of E. in the pulmonary diseases of infancy is of great value, as infants swallow the discharges from the lungs. E. are partly vegetable and partly mineral, the more important of the former being mustard, ipecacuanha, sanguinaria, &c.; and of the latter, sulphate of zinc, sulphate of copper, and tartrate of antimony. E. that may be taken safely without medical prescription are, for an adult, a teaspoonful of mustard, or 20 grains of ipecacuanha, in tepid water.

Em'etine. See IPECACUANHA.

Emigra'tion, the removal of persons from one country to another for the purpose of permanent residence. Among nations historically identified with E. are the Greeks, Spaniards, Dutch, and Portuguese. In late years the great body of emigrants are English, Irish, and German. The following figures will show the growth of the practice. In 1815, 2081 persons left, but by 1819 this had increased to 34,787. The numbers fluctuated until 1830, when they began to rise, reaching 103,140 in 1832. From 1846 to 1854 there was a steady rise up to 368,764, but this point reached, they fell to 91,770 in 1861. Since then there has been a steady rise from England and Scotland, but a decrease in Irish E. It must be recollected, however, that nearly all the Germans go through from Hull to Liverpool. In 1872 the number of foreigners emigrating through Britain was 79,023, out of a total of 295,212 in the United Kingdom. The percentages of E. are—English, 56·15; Scotch, 9·28; Irish, 36·57. Since 1847 the Government has sent out 340,299, chiefly to Australasia and the Cape of Good Hope. The Government also commutes day-pensions into the expense of a passage. The returns of immigrants and liberated Africans introduced into the W. India colonies and Mauritius are very interesting. Thus during the thirty years prior to 1872, Jamaica received 25,000 persons, of whom 16,000 came from the E. Indies; British Guiana received 160,000, of whom 80,000 came from the E. Indies, 28,000 from Madeira, 23,000 from the W. India Islands, 13,000 from Africa, and 12,000 from China. Trinidad has received 60,000—44,000 from the E. Indies, only 2665 from China. Mauritius has received 358,000, of whom 352,000 were from the E. Indies and 2500 direct from captured slavers. During the last thirty years about 125,000 immigrants, liberated Africans and Kroomen, returned home from these colonies. The practice of the colonies as regards E. assistance is various. Thus the Canadian Dominion agent gives $10 per statute adult. No free passages are granted to South Australia, but land orders of £20 per statute adult are given on landing. The Queensland Agent-General gives free passages to female domestics and emigrants of the farming class. One of the most unpromising fields of E. recently opened to Great Britain is S. America. During the twenty years that the Emigration Commissioners have administered the Passenger Acts (q. v.) only 4 out of 853 chartered ships (carrying 312,526 souls) have been lost, and only one (*The Guiding Star*, 1855) with loss of life. In British Guiana coolies can make as much as 3s. 10d. per day. In New S. Wales the land is disposed of at an average rate of £1, 11s. 3½d. per acre in the settled, and £1, 1s. 3d. in the pastoral districts. The colony derives an annual income of half a million sterling from her Alienation, Occupation, and Gold Field Acts. The Queensland Immigration Act of 1869 provides for part payment of passage-money before embarkation, the rest to be paid two years after arrival in the colony. In Victoria ploughmen make 18s. 9d. per week with rations; shepherds about £31, 12s. per annum. A variety of recent Acts in S. Australia authorise the sale of rural land on credit at very cheap rates. In Canada there is almost always a brisk demand for immigrants. Ordinary labourers make from 4s. 1d. to 6s. per day; masons and bricklayers, from 6s. to 10s. 2d.; female domestics, from 12s. 4d. to £2, 9s. 3d. per month. The Dominion agent arranges assisted passages on the Allan, Dominion, and Temperley lines of steamers. The land in Manitoba is one dollar an acre, payable in cash or military bounty warrants, heads of families receiving a free homestead grant of ten acres. There is a valuable system of emigrant aid societies in the townships. The public business of E. ought certainly to be highly profitable, and on this ground, as well as from the duty of relieving the pressure of population at home, and the prudence of retaining a certain control over colonial development, it has been argued that mother countries ought to assist colonies in the matter.

Emigration, Law Regarding.—By 7 Vict. c. 101, owners and ratepayers may raise or borrow money, not exceeding half the average yearly rate for the three preceding years, to enable the poor to emigrate; but the money must not be raised on the security of the rate without the consent of the Commissioners, and the period of repayment must not exceed five years. Guardians apply the money to the expense of E. The Act 13 and 14 Vict. c. 101 contains provisions for facilitating the E. of poor orphans and deserted children. These Acts do not apply to Scotland; but by 14 and 15 Vict. c. 91 advances may be made out of money authorised by the Act to be advanced for the improvement of the land to help the E. of the poor in the Highlands and islands of Scotland. See SHIPS' PASSENGERS ACTS.

Émigrés ('emigrants'), the name given to the French nobles and clergy who fled from France on the outbreak of the Revolution in 1789. Many of them were indemnified on the Bourbon restoration. See Saint-Gervais, *Histoire des É. Français* (Par. 3 vols. 1823).

Emil'ia (named after the *Æmilia Provincia* of the Romans, on the famous *Via Æmilia*), a former division of N. Italy, consisting of parts of the Romagna and of the duchies Modena and Parma, now portioned into nine modern provinces. In the N.E. it is flat and marshy, in the S.W. mountainous and interspersed with fertile valleys. Bologna forms its centre.

Em'inence (Lat. *eminentia*), an ecclesiastical title, the employment of which was restricted by special enactment of Pope Urban VIII., 1630, to cardinals, ecclesiastical electors, and the Grand Master of the Order of the Knights of St John.

Emir' (Arab. 'ruler'), the title given to all the descendants of Mohammed's daughter Fatima, who are distinguished by the green turban. It is assumed by many tribal chiefs in the East and in N. Africa. The E.-al-Mumenin, 'Prince of the Faithful,' is a title of the califs; E.-al-Omra, 'Prince of Princes,' is at present in Turkey the title of provincial governors; E.-Hadji, leader of the pilgrims; E.-Bazaar, market inspector, &c.

Emman'uel College, Cambridge, was founded by Sir Walter Mildmay, Chancellor of the Exchequer to Queen Elizabeth, in 1584. It has thirteen foundation fellowships open to all her Majesty's subjects; two fellowships and four scholarships on Sir W. Dixie's foundation; thirteen open scholarships of £70 a year and five of £30, paid from the college revenues; five scholarships of £30, founded by Dr Thorpe; and seven scholarships varying from £16 to £35 per annum, for which candidates from certain schools have the preference. The number of undergraduates in 1875 was 70.

Emmen'agogues, medicines which maintain or restore a healthy condition of the menstrual discharge, and produce contraction of the uterus during and after childbirth. The chief E. are aloes and myrrh, chloride of ammonium, borax, ergot with hyoscyamus, ferrum redactum, ruta, and sabina.

Emm'erich, a walled town in Rhenish Prussia, on the right bank of the Rhine, 5 miles N.E. of Kleve by railway, with an active shipping trade on the Rhine, and manufactures of tobacco, chocolate, and leather. Pop. (1871) 7817.

Emmetro'pia, the condition of the normal eye as regards power of sight for different distances. Near-sightedness is called *Myopia*, and far-sightedness *Presbyopia* (q. v.).

Emm'ett, Thomas Addis, son of a physician, was born at Cork, 24th April 1764. He was educated for the law, which he

abandoned to become a leader of the 'United Irishmen.' On the Irish insurrection of 1796–98 being suppressed, he was arrested; but his sentence of imprisonment was commuted to exile, and removing to New York, he became a distinguished lawyer. He died November 14, 1827.—**Robert E.**, younger brother of the above, was born in Dublin, 1778; was intended for the bar, but joined the Irish insurgents; was captured, and executed September 20, 1803. His death and his love for Miss Curran are the subjects of two of Moore's *Irish Melodies*.

Emo'dic Flo'ra, a name given to plants, as species of *Cedrus*, *Pinus*, *Picea*, &c., found in the 'Emodic region,' or that part of India to the S. of the Himalayan ridge, and from 4500 to 10,700 feet above the sea. The average temperature of the region is from 37° to 66° F.

Emoll'ients (from Lat. *mollis*, 'soft'), substances used to soften the tissues. Externally they are applied as poultices and fomentations, and internally as demulcents. The principal E. are gums acacia and tragacanth, fats, wax, cetaceum, glycerine, collodion, cydonium, linseed, flour, starch, decoctions of barley and linseed.

Emo'tion (from Lat. *e*, 'out,' and *moveo*, 'I move') is one of three fundamental properties of the human mind, the other two being volition and intelligence. Though separated for the purpose of scientific analysis of their separate laws, the three functions are generally present in varying proportions in every mental state. E. includes all the pleasures and pains, the particular sensations, including muscular feelings, and general excitements of the nervous system. It is singular that while Reid's division into intellectual and active powers formally leaves no room for E., Brown's division of internal states into intellectual states and E. leaves no room for volition. The phenomena of E. are, however, described by both writers. One general condition of E. seems to be a change in the mode or intensity of the cerebral and other processes. Once aroused, it tends to diffuse itself over the brain, and unless suppressed or exhausted, passes into the moving organs and the viscera. One large class of characteristic effects of E. is expression, *i.e.*, definite excitement of the muscles of face and features. The muscles of the chest and larynx are in many cases stimulated, and characteristic sounds are emitted. The whole body may be agitated, but the following parts chiefly express and propagate E.—the lachrymal gland and sac, the sexual organs, the digestive organs, the skin, the heart, and the lacteal gland in women. Characteristic examples of this are the suppression of the flow of the saliva by fear, the spasmodic contraction of the muscles of the pharynx by grief, and the flow of tears caused by tender E. such as pity. Besides specific expression of each class of feelings, it is a general law that pleasant feelings tend to increase the activity of the vital functions, while the tendency of painful feelings is to depress these functions. This is very obvious in the case of pleasurable muscular exercise, and is not contradicted by the pleasure of repose, which may be attended by a reflux of blood to the brain and stomach. The pleasures experienced from respiration and digestion, indeed all the organic pleasures, come under the rule. The pain of cold is only an apparent exception, for it checks perspiration, the function of the skin, although it may at a certain point stimulate the nerves and muscles. On the other hand, indigestion, skin-disease, and, in fact, most diseases, are accompanied by painful feeling. Pleasure, again, has generally a fuller, more intense expression than pain. Pain more often depresses the system and relaxes the muscles; sometimes, however, this is done by very intense concentration of energy on particular muscles. The frenzied excitement of great pain is really a case of shock. The contrast between the two tendencies is best seen in laughter, which sets in violent vibration whole systems of muscles; and grief, which, when severe, 'beats a man down.' The pleasures of sensation seem at first an exception. Even here, however, the pains of touch, hearing, and vision are chiefly due to excess of stimulus. This fact suggested the theory that in all cases pleasure and pain depend on the degree of violence with which the nerve or the sensorium is affected. It must be remembered in dealing with such theories that even where, as in light and sound, it might be possible to connect the painful effect with an increase in the number or character of the external vibrations, we know nothing whatever of the specific mode in which either a sense-pleasure or a sense-pain affects the nerve. But as regards taste and smell, although theory has also attempted to resolve them into vibrations on the external side, it is clear that some substances produce nothing but pleasure, and others nothing but pain. These then must be regarded as specific stimuli, producing nervous muscular activity independently of their character as pleasant or painful. The higher emotions, as wonder and love, illustrate the general rule; those which are pleasant strengthen and give tone to life, whilst shame, hatred, and the like are depressing. The stimulating drugs, on the other hand, alcohol, tea, &c., do not enhance vital action, except indirectly, and then generally at the cost of reaction. The Platonic theory, expounded in the *Gorgias*, that pleasure consists in the supply of a want or the negation of pain, and that pain consists in want, is now generally abandoned as inconsistent with the facts of experience, for men are conscious of indifference, also of pleasure unmixed with pain. The Hamiltonian theory is that pleasure may arise from faculties, capacities, dispositions, and habits, known as various forms, potential and actual, of 'energy.' Pleasure is the reflex of a spontaneous and unimpeded energy. A spontaneous energy is that which is neither strained above nor depressed below a certain pitch, and unimpeded energy is that which reaches its object. This theory is purely verbal, the word 'energy' being defined so as to meet all the known cases of pleasure. The most important distinction in feeling, after pleasure and pain, is that of degree; E. may be either acute or massive. This distinction enters into the volitional strength of feeling, and also into its ideal persistence, or its capacity of being reproduced by the intellect. E. tends to occupy the mind, and a pleasant feeling in idea is the germ of desire. In the same way E. powerfully affects belief, excluding from the mind what interferes with the contemplation of itself. Besides the emotions which may be called primitive, and which are enumerated below, there are emotions formed by the harmony or discord of simple sensations experienced together, by the transfer of feeling from its original causes to contiguous objects, by coalescence of separate emotions. Of this last, the most conspicuous example is conscience. There are also certain general emotions depending on the amount of change operated on the system, and these are novelty, surprise, and wonder; liberty, as opposed to restraint, and power, as opposed to impotence. These emotions of contrast are the real foundation of the Platonic theory. The chief forms of special E. are fear or terror; tender emotions or love, branching out into those of admiration, reverence, and esteem, and by further associations into self-complacency and approbation or glory; power; anger, or the pleasurable E. of malevolence. Connected with the volitional side of the mind there are the higher emotions of pursuit; the exercise of the intellect yields a characteristic E. in the perception of resemblances, and in the jar of contradictions; and there are also æsthetic emotions interwoven with intellectual association. Last of all, comes the E. of the moral sense, which varies from the rudest instinct up to the most sensitive and complex of faculties. The classification of the emotions directly affects æsthetics and phrenology. Among others may be mentioned that of Brown into immediate, retrospective, and prospective; of Hamilton into contemplative and practical; of Spencer into presentative (sensations); presentative-representative, *e.g.*, terror; re-presentative (ideal sympathy with another); re-representative, as property, justice. See Stewart on *The Active Powers* (1828), and Bain, *Emotions and the Will* (3d ed. 1875).

Emotions, Physiology of.—The anatomical seat of the emotions is undoubtedly some part of the cerebral hemispheres. Disease of these organs produces the various forms of insanity, in which the emotions are more or less affected. But they are related to the rest of the body in a complex way, the exact physiological mechanism of which at present is not understood. The emotions may be affected (1) by various states of the body, or (2) by outward impressions, and, on the other hand (3), they can influence the actions of various organs. Thus is it that weak digestion, torpidity of the bowels, or uterine disorder, may produce melancholia, or a depressed state of certain of the emotions. Again, laughter, crying, and dancing excite corresponding emotions. It is well known that emotions depress or exhilarate the action of the heart and other functions, even to the minute blood-vessels, as in the blush of shame or the pallor of fear. See Müller's *Physiology*, Bell's *Anatomy of Expression*, and Darwin's *Expression of the Emotions in Man and Animals*.

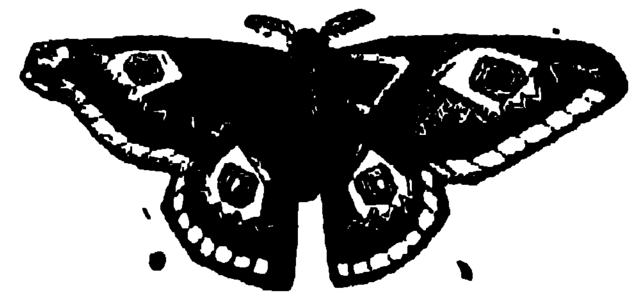
Empann'el in English law denotes the enrolling by the sheriff of the names of jurors. The schedule of names is called a panel, and those named in it are bound to attend to serve upon the grand and petty juries.

Empecina'do, Don Juan Martin Diaz, el, was born at Castrillo in 1775, enrolled as a volunteer in 1808, and as a guerilla chief inflicted signal losses on the French occupants of Spain. He was made a general, and in 1815 petitioned Ferdinand VII. to establish a constitutional government, for which he was imprisoned. In 1820 he pronounced in favour of the Cortes, and in 1823 held a command in the corps of General Palencia. On the suppression of the revolution in 1825, this patriotic soldier was captured and executed as a traitor.

Emped'ocles, a Greek philosopher, who flourished about B.C. 444, was born at Agrigentum in Sicily. He belonged to a wealthy class, but supported the democratic party, and was benevolent as well as magnificent in his mode of life. A passage in Aristotle's *Metaphysics*, i. 3, has thrown much doubt on E.'s philosophical position. He derives much from Pythagoreans and Eleatics, and the tradition is that Anaxagoras was his teacher. In the fragments of his writings preserved he laments the uncertainty of ordinary knowledge, and states that a *dæmon* (a soul) polluted with guilt must wander apart from the blessed 30,000 years. He deduced abstinence from animal food from the doctrine of metempsychosis. As like can be known only by like, and as the idea of God, the perfect mind pervading the world, is recognised by man, God must exist. Creation is not an absolute beginning or ceasing to be, but a 'mingling and then a separation of the mingled,' there being four primary elements—earth, air, fire, water. This seems a combination of the fire of Heraclitus and the *homoiomeriæ* of Anaxagoras. But in place of the *desire* of the former, and the *nous* of the latter, E. selected *love* as his formative power. It was hate or separation which produced the misery of the sensible world. We must add his beautiful conception of God—'the sphere in the bosom of harmony, fixed in calm rest, gladly rejoicing.' His system seems to have been emotional and fanciful rather than logical. E. is eulogised by Lucretius in his *De Rerum Naturâ*. The fragmentary writings of E. extant have been edited by Sturz (2 vols. Leips. 1805), Karsten (Amsterd. 1838), and Steinn (Bonn, 1852). See Lommatzsch, *Die Weisheit des E.* (Berl. 1830), and Gladisch, *E. und die Ægypter* (Leips. 1858).

Em'peror (Fr. *empereur*, Lat. *imperator*, *impero*, 'I command'). The primary meaning of E. was a commander-in-chief; and next, one sent on any important expedition. Cæsar assumed the name as a prænomen. This continued under the Empire, *imperator* only becoming part of the formal title after the Antonines, the proper term being *princeps*, or first man in the senate. In the early stages of the Roman Empire the absolute power of the E. was disguised by the form of a senate, but in the 2d c. Septimius Severus was the apparent autocrat of the Roman world. Temples were raised to him when living, and when dead he was called *divus*. As the successor of the Pontifex Maximus, but still more from there being no chief patriarch of recognised authority, the E. became the head of the Church. He presided in councils, issued edicts against heresies, and was 'orbis Christiani custos.' Even after the division of Karl the Great's empire the E. was revered by the nations of Europe. Though he had no definite political supremacy over all, the mediæval E. ('Imperator terrenus') was the advocate of the Church—a 'secular pope,' deriving authority not through the spiritual pope, but direct from heaven. The position of the E. was greatly strengthened by the fusion of the title with that of the feudally powerful 'King' of the Eastern Franks. The 'Rex Francorum' was first discontinued by Otto the Great (A.D. 962), 'Imperator Augustus' being alone retained. In the feudal conception the E. was the suzerain of all kings and potentates. Various countries at times owed allegiance to the E. Thus Hungary, Denmark, Poland, and France acknowledged Otto the Great. The great interregnum beginning in 1254 loosened many of these relations. Spain, England, and Venice never admitted the supremacy of the E., and the Byzantine princes constantly protested against his title. The E. was crowned at Aachen, the original capital of the (Eastern) Franks, but after Heinrich II.'s time, 'King of the Romans,' at Pavia, or latterly at Milan or Monza, where he became King of Italy or of the Lombards, and at Rome, where he received the crown of the Roman Empire. The coronation at Rome was not held to confer the ownership of the separate kingdoms. Such importance was attached to it, however, that the Italian writers do not include in their list emperors who were not crowned at Rome, and the dates of the *regnum* and the *imperium* are in every case distinguished. This distinction was supported by the Empire passing from one family to another, the Karolings, Italians, Saxons, and Franconians. Hence sprang the later theory that the pope was lord paramount, and the E. a vassal receiving a fief on conditions variable on each investiture. The word *holy* was applied in the German court, as at the Roman, to the person of the E. The E., at least in the 14th and 15th centuries, sought to represent a spiritual unity by deciding the disputes of inferior sovereigns, a right based on his divine commission. Among other secular privileges of the E. was that of creating kings, and he was the head and centre of the institutions of chivalry. In theory the Empire could be held by any man free-born and orthodox. By the Treaty of Westphalia large changes were made in the position of the E. The rights of making war and peace, levying contributions, passing or interpreting laws, were given to the Diet. The Reformation destroyed the Catholic theory of Empire. The subsequent changes in the attitude of the E. belong to the history of Austria and Germany. The title was dropped in 1806. In 1870 Germany again became an empire, which, however, does not claim to represent the Roman Empire. The German E., or E. *in* Germany, is the E. of a federation, not of all Christians. In the imagination of Napoleon I. the French Empire was a revival of the Karoling idea; he claimed authority over the pope, and called his son 'King of Rome.' The modern notion of E. is the somewhat inconsistent one of an elective despot. The title has been adopted by several new dynasties, as Brazil, Hayti, and Mexico. Barbarous princes, like those of China and Abyssinia, also prefer the title to that of king. It was assumed by the sovereign of Britain, to express the relation in which she stands towards the rajahs of India, in 1876.

Emperor Moth (*Attacus*, or *Saturnia, pavonia minor*), a species of Lepidopterous insects, the larva of which, common on heather in summer, is green, and has seven hairy pink tubercles set on black rings. It is the largest British moth. Each wing has a large transparent spot. The *Attacus major*, the night or peacock moth of France, may attain an expanse of wing of 5 inches. The E. M. is nearly related to the silk-moth.



Emperor Moth.

Empetra'ceæ. See CROWBERRY.

Em'phasis. See ACCENT.

Emphyse'ma (Gr. *emphusaō*, 'I inflate'), a distension of the body with air. E. of the lungs may be *vesicular* or *interlobular*. *Traumatic* E. is most commonly caused by a wound of the *pleura costalis* and the lung from an external puncture or a fractured rib. E. is sometimes caused by foul gases escaping into the cellular tissue.

Emphyteu'sis (Gr. 'an implanting'), in Roman law, a right in land granted by the superior for a yearly rent called *canon emphyteuticus*. The *emphyteuta*, or tenant, was not allowed to sell without making the first offer to the *dominus*, but he was entitled to the full profits of the subject. The word E. has been applied to Scottish feu-holding.

Empir'ic (Gr. *empeirikos*, 'a searcher after facts in nature,' from *peiraō*, 'I try') originally meant a man who gained his knowledge from experiment, and was applied to a medical school founded by Philinus of Cos and Serapion of Alexandria, which made the science of medicine depend upon experience, but which afterwards neglected science and fell into disrepute. Consequently a quack or pretender in any field, but chiefly in medicine, is called an E. Empiricism, in philosophy, is applied to the system which is based on observation and induction.

Empiric For'mulæ, in chemistry, are the symbols employed to denote the quantities of the respective elements of a substance

without giving an insight into its constitution or the arrangement of its atoms. See CHEMISTRY.

Empir'ical Laws are laws which seem to hold during the occurrence of certain phenomena, but which do not give the explanation or cause of these phenomena as in Bode's Law (q. v.). Kepler's were E. L. until Newton established his theory of gravitation. In time, probably, they will be shown to be all dependent upon a few great underlying principles.

Emplas'tra (Gr. *emplassō*, 'I spread on') are external applications, of a firmer consistence than ointments, spread on linen or leather. They are mostly made from powders, extracts, or gums, and owe their consistence to metallic oxides, or to wax, resin, &c. Almost every solid medicine may be applied in this form, so that the non-official preparations are numerous.

Em'poli (a corruption of the Lat. *emporium*, 'the market-place'), a town of Italy, on the right bank of the Arno, in the province, and 16 miles below the city, of Florence, with which it is connected by railway. It has a fine church of the 11th c., adorned with paintings by Giotto. Pop. 6500, who manufacture cotton and leather, and trade in fruits and grain.

Empo'rium (Gr. *emporion*, from *emporos*, 'a wholesale trader;' Lat. *emporium*), the centre of a special commercial or manufacturing industry, or a warehouse for the storage and disposal of goods.

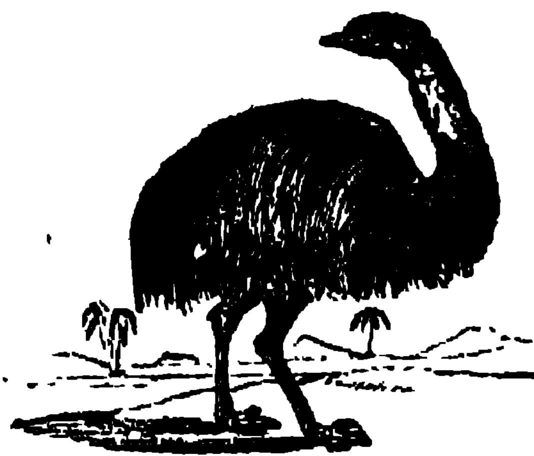
Emp'tion. See SALE OF GOODS.

Empye'ma, an accumulation of pus in the chest, caused by secretion in the pleural cavity, or by the bursting of an abscess of the lung. In the former case it is the result of pleuritis, and in the latter of organic disease or injury of the lungs. E. generally proves fatal, but is sometimes cured by drawing off the fluid with a trochar and canula.

Ems or **Bad-Ems**, a market-town in a narrow valley on the Lahn, in the Duchy of Nassau, 6 miles S.E. of Coblenz by railway. It was celebrated for its baths as early as the 14th c. The springs, which are alkaline, vary in temperature from 93° to 135° F., and are beneficial in nervous and stomachic complaints. Near E. are silver and lead works. Pop. (1871) 5458. See Döring, *Die Thermen von E.* (1869).

Ems (probably the *Amisia* of Tacitus), a river in N.W. Germany, rises in the S.W. slope of the Teutoburger Wald near Paderborn, flows N.W., receives the Leda and Hasse, and enters Dollart Bay, near Emden, after a course of 215 miles. It drains an area of 5200 sq. miles, and is two-thirds navigable.

E'mu or **Emeu** (*Dromaius Novæ-Hollandiæ*), a bird belonging to the family *Struthionidæ*, order *Cursores*, and is a native of Australia. It attains a height of from 5 to 7 feet, and its plumage is light brown mottled with dirty grey. The throat is nearly naked, but the head is feathered, unlike that of the cassowary, from which the E. also differs in having no horny crest or pendant wattles. The three toes are directed outwards. The E. is monogamous, and lays from nine to thirteen dark-green eggs. They are placed in a hollow on the ground and hatched by the male, which is smaller than the female. The E. is swift, but can be hunted down with dogs. It inhabits the plains, living upon grass and wild fruits. An amber-coloured oil, esteemed for its anti-rheumatic properties, is made from its skin, a full-grown bird yielding from six to seven quarts. The E. can be easily domesticated; but no pains having been taken to rear it, it is dying out rapidly.


Emu.

Emula'tio Vici'ni, in Scotch law, denotes a limit to the exercise of the right of property. A proprietor is not restricted in the use of his property because the use is hurtful to his neighbour, but he must not exercise his right purposely to injure his neighbour.

Emul'sin, or **Synap'tase**, is a nitrogenous substance occurring in bitter almonds along with amygdaline. It is a species of ferment, and when added to solution of amygdaline, causes the latter to take up water and to split into hydro-cyanic acid, oil of bitter almonds, and grape-sugar.

Emul'sions (Lat. *emulgeo*, 'I milk'), are white liquid preparations obtained by mixing oil and water by the addition of some mucilaginous or saccharine substance, as camphor, balsams, &c. Emulsion of bitter almonds is used in cough-medicines.

Em'ydin, a substance found in the yolk of turtles' eggs. It is probably derived from the decomposition of some more complex albuminous substance. A somewhat similar substance called *ichthin* has been found in the eggs of fishes.

Em'ys, a genus of Chelonians, represented by the terrapins or water-tortoises, belonging to the family *Emydidæ*. In this family the head is flat and covered with skin, the neck is retractile, the feet are broad, the nails sharp, the toes webbed, and the tail is conical and furnished with plates. In E. there are four hinder and five front toes. The most familiar species are the chicken tortoises (*E. reticularia*) and the lettered tortoises (*E. scripta*), both common in N. American lakes. The former is from 6 to 9 inches long, and is brown in colour. The lettered tortoise is so named from the markings on the edge of the body. The Quaker tortoise (*E. olivacea*) has long fore-claws. Allied to the E. are *Malaclemys*, *Cistuda*, *Chelydra*, &c.

Enam'el (Fr. *émail*, Old Fr. *esmail*, Ital. *smalto*, of Ger. origin, *smalti* in Old High Ger. meaning 'what has been fused or melted;' comp. mod. Ger. *schmelzen*, and Eng. *smelt*), a vitreous compound, consisting of a basis of transparent glass combined with colouring metallic oxides, applied principally to the surface of metal and fused by the action of fire. E. is either opaque or transparent according to the oxide. The oxide of tin produces an opaque white E., such as is seen on watch-dials, and a little peroxide of manganese communicates a violet tinge to it. Oxide of cobalt produces blue; oxide of lead yellow; the oxide of copper green; cuprous oxide ruby-red, &c. Any work of art in metal encrusted or painted with E. colours is commonly called an E. The art of decorative enamelling is of great antiquity, and had its origin in the East. There are different styles of metal enamelling, distinguished as *cloisonné*, *champ-levé*, and *painted* enamels. In the last, opaque or semi-fluid colours are spread over the surface of the metal with a brush. In cloisonné enamels, partitions (French *cloisons*) formed of slender strips of copper are soldered on the metal surface, and in champ-levé enamels spaces are dug out of the metal, and in both cases the cells are filled in with E. paste, which is permanently fixed to the metal by fusion. Old enamels from China and Japan are masterpieces of the art, and are highly valued. Chinese enamels are distinguished for brilliancy of colours, while Japanese enamels are unsurpassed for beauty and intricacy of design. The most interesting mediæval Greek E. extant is the celebrated Pala d'Oro, an altar front in St Mark's at Venice. In France and England cloisonné enamelling is now carried on extensively. A celebrated firm is that of Messrs Elkington & Co., Birmingham.

In champ-levé work metal plates with prepared troughs are now obtained by casting and by electro-deposition. Champ-levé was practised extensively in Constantinople, and early in the 12th c. Köln and Limoges were the great seats of its manufacture. The largest enamels were executed in this method, because there was little difficulty in procuring large plates of copper. Two varieties of champ-levé are recognised: one, belonging to the 11th and 12th centuries, has the flesh-tints and draperies as well as the ground represented by E.; and the second, practised in the two following centuries, has the figure chased in low relief on a gilded ground, the E. being restricted to the space around the figure. Early in the 14th c. Italian artists struck out a new path, and produced the translucid enamels upon relief, the design being chased upon a gold or silver plate and covered with brilliant E. tints. Painted enamels originated with the Limoges artists of the 15th c. The design was no longer expressed by engraved lines, but by colours mixed with fusible fluxes, applied to a copper plate. The plate was covered with a translucent flux, and upon this the design was outlined with a black E., around which the other colours were filled in. Flesh-tints were rendered upon a violet ground with white E. applied in varying thicknesses, to secure effect of light and shade, and the background and draperies were

heightened with golden touches. In the 16th c. *grisaille* (grey) enamels were produced at Limoges by working upon a thick dark-coloured layer with white opaque E., shaded flesh-tints being retained for the face. Translucent colours were sometimes spread over the grisaille. The chief artists of the late Limoges school were the Penicauds, L. Limousin, the Courtois or Courteys family, Jean Court, also called Vigier, Martin Didier Pape, and Pierre Raymond or Rexmon. The main difficulty of E. painting consists in the artist not having actual colours to work with, but substances which are to take these colours after firing. See ENCAUSTIC PAINTING.

The coating of the inside of cast-iron pots and saucepans with E. glaze, to protect them from the action of acids, is comparatively new. Still more recent is the application of coloured E. to plates of iron for use as railway and other signs, dials, &c. Articles of cast-iron are prepared for enamelling by being heated to a low red heat and slowly cooled, scoured with sand in warm dilute sulphuric acid, then washed and dried. Several coats of E. mixtures of variable composition are then applied, one coat being vitrified before the next is laid on. Letters and ornamental designs in E. colours are stencilled and fused upon the last coat.

Enamel is the name given to the hard external coating of the teeth, which contains a large quantity of oxide of lime.

Ena'ra, or **Inare**, a lake of Russia, in Lapland, 60 miles long and 20 broad, in about lat. 69° N. and long. 28° E., has an area of 1050 sq. miles. It is studded with islands, and connected with the Varanger Fiord by the Pasvig River.

Enar'ea, a country of the Gallas, in Africa, to the S. of Abyssinia, in lat. 7° to 9° N. and long. 36° to 38° E. It is bounded on the N. by the Blue Nile, is watered by the Borora, Dedhesa, Baro, &c., and is intersected by offsets of the Abyssinian highlands. Coffee is extensively cultivated, and there is an active trade, chiefly in gold, ivory, civet, skins, and ornamented arms. The Mohammedan religion prevails. Saka is the capital, and among other towns are Gombola, Jadara, and Fadassi.

Enarthro'sis (Gr. *arthrōsis*, 'a joining') is the ball-and-socket form of joint, like the shoulder and hip, allowing motion in every direction.

Encamp'ment (Lat. *campus*, 'a plain') is the temporary station occupied by an army or division, with its artillery, baggage, or stores. In early times an established arrangement of the troops, &c., in camp, was rigidly adhered to. (See CAMP.) In modern times, the leading idea in arranging an E. is to dispose the lines so that at a few minutes' notice every battalion shall be able to assume its position in order of battle. The extent of the front is determined by the number of troops in camp, and is generally calculated at the rate of two paces for every file of infantry, and three for each file of cavalry. The tents for infantry now generally in use accommodate fifteen, those for cavalry twelve men each, and they are usually ranged in rows or 'streets.' In the single rows of cavalry, a total frontage of 19 yards must be given for each troop. The extent of front covered by the tents of each battalion is no greater than that battalion will occupy in order of battle. In selecting a site for E. it is desirable to choose a spot where wood and water can be readily obtained; the front should be covered by forest or stream, and the rear be perfectly open. Formerly the natural strength of the site of a camp was a matter of first importance; and even in our own time, when a complete watching system has been elaborated, the natural defences of a site—the marshes and rivers which bound it, &c.—and the character of the roads converging upon it, are carefully considered in encamping. For camps of instruction, see ALDERSHOT, KILDARE, &c.

Encaus'tic Painting (Gr. *en*, 'in,' and *kaustikos*, 'caustic,' from *kaiō*, 'I burn'), a process of using colours mixed with wax and subsequently heated, somewhat akin to enamel painting. Ancient descriptions of the art, as practised by the Greeks and Romans, are not quite clear as to the modes of operating. In one process it would appear that the wall was first coated with wax, and upon it a design was outlined with a style, and filled in with colours in a wax medium with a hot spatula, the whole being subsequently polished. The art, lost for centuries, but revived in the 18th c. by Bachelier, Comte Caylus, and Miss Greenland, is seldom practised now.

Encaustic Tile, a tile with an ornamental design produced by inserting and 'burning in' coloured clays. Encaustic tiles were much in vogue for pavements in cathedrals during the middle ages, but for some centuries later the art of making them was neglected till it was revived and brought to great perfection by the late Herbert Minton. The modern process is as follows:—From red clay consolidated into a 6-inch cube a sufficient thickness to form the body of one E. T. is cut off with a wire. The upper side of the tile is then faced with fine clay to form the ground of the pattern, and a coating of the same material is applied to the lower side, and pierced with holes to prevent the tile warping. A plaster-of-Paris mould, bearing the intended pattern in relief, is then pressed upon the tile, and the indentations so formed are filled with various-coloured 'slips,' or fine clays, in a semifluid state. After partially drying, the superfluous slip is scraped off, and the coloured pattern left flush with the surface is then slowly dried and baked. Hard non-porous encaustic tiles are extensively manufactured in the Stafford potteries, and encaustic floors, even in dwelling-houses, are now common.

Enceinte' (Fr. 'an enclosure,' from Lat. *incincta*) is a term in fortification used to designate the wall or rampart enclosing a fortified place, and secondarily the whole of the fortified area.

Enceph'ala (from Gr. *kephalē*, 'the head'), a name given to the three higher classes of Mollusca, the *Gasteropoda*, *Pteropoda*, and *Cephalopoda*, from the fact that they possess a well-developed head. These groups are so named in contradistinction to the Lamellibranchiate molluscs, or *Acephala*, which possess no distinct head.

Encephalar'tos, a genus of Exogenous plants belonging to the *Cycadaceæ*. The species of E. produce starch. *E.* or *Zamia pungens* ripened and produced its fruit at Chatsworth in England. Many species afford 'Caffre bread.'

Encephali'tis, or **Cerebri'tis**, inflammation of the brain substance, or of the structures generally within the cranium, is often associated with *meningitis*, and followed by softening or induration. There are two varieties of softening of the brain —(1) Inflammatory *red softening*, or acute ramollissement; and (2) *white softening*, the result of an atrophic process. Red softening is frequently followed by abscess, and is essentially a fatal disease. In induration, the texture of the brain resembles the white of egg boiled hard, the convolutions being flattened, and there is an absence of blood and serum in the encephalon. Causes:—Morbid poisons, associated with zymotic or constitutional diseases; intemperance; *coup de soleil*; great mental excitement, and uncontrolled moral feelings, &c. E. may be *traumatic*, resulting from injury; or *idiopathic*, *acute* or *chronic*. In acute E. there is usually delirium, followed by a loss of mental power terminating in dementia. In chronic E. the mental symptoms may be slight; but there is always loss of intellectual vigour, failure of memory, confusion of ideas, and irritability of temper. The disease often ends in general paralysis, or death from apoplexy. Treatment:—General measures must be adopted to remove the exciting cause, and the brain must have perfect rest. Hygienic measures and a change of scene are of primary importance.

Enceph'alon, a term sometimes applied to that part of the nervous system within the skull. See CEREBRUM.

En'chesone, in Scotch law, denotes the reason for doing anything—*e.g.*, The vassal is in the keeping of his superior by *E. of ward*, that is, by reason of the nature of his holding.

Enchondro'ma, or **Cartilag'inous Tu'mour**, may be innocent or semi-malignant. In the first case it is smooth, elastic, round or flattened, seldom exceeding the size of an orange, and growing slowly without pain. In the second it is rapid in growth, attains an enormous size in a few months, and deposits secondary growths in internal organs, which are frequently associated with encephaloid cancer. The treatment consists in excision of the tumour, or amputation of the affected part, when possible.

Encho'rial Writing. See HIEROGLYPHICS.

Enck'e, Johann Franz, was born at Hamburg, September 23, 1791, studied at Göttingen, served from 1813-14 in the Hanseatic Legion, and in 1815 was appointed a lieutenant of artil-

lery in the Prussian army. He left the service and became astronomer at the Seeberg Observatory near Gotha, whence he went to Berlin in 1825. He was made editor of the *Berliner Astronomische Jahrbuch* in 1830, and died September 2, 1865. E.'s chief works are *Die Entfernung der Sonne* (2 vols. 1822-24), and *Ueber die Hansensche Form der Störungen* (1856). His greatest labours are the determination of the orbit of the 1680 comet; the reduction of the transit observations of 1761 and 1769, and calculation of the sun's parallax; and the discovery of the short-period comet which goes by his name. See Bruhn's *Life of E.* (1869).

Encke's Comet has the shortest period and the least aphelion distance of all the known comets. It revolves in a very eccentric ellipse, which does not, however, extend to the orbit of Jupiter, and moves in a plane inclined at an angle of about 13° 20' to the ecliptic. The period is 3·29 years, but it seems to be lessening by about two hours and a half every revolution, a fact accounted for by Encke by the presence of a resisting medium pervading space. It was first recognised by Encke as a comet of short period in 1819, and its subsequent appearances have been so accurately observed, that its orbit and motions are as well determined as those of any planet. Its next appearance will be in 1878.

Encore' (Fr. 'again,' Old Fr. *ancore*, Ital. *ancora*, a corruption of the Lat. *hanc horam*), a call made by an English audience for the repetition of a part of a performance. The French similarly cry *bis* (twice).

Encrini'tal Lime'stone, a name given to certain limestones intermingled with rocks of Carboniferous age, from their containing vast quantities of fossil Encrinites or Crinoids.

En'crinite, or Lily Star, the name given to certain fossil *Echinodermata* (q. v.) belonging to the order *Crinoidea* (q. v.). There are few living species of crinoids, whilst a vast number of fossil species popularly named E. are known. The crinoids appear to be first represented in the Lower Silurian rocks. The Carboniferous or Coal period is, however, the great region of crinoids. Many strata of Carboniferous limestone are wholly composed of crinoid remains; and the crinoids of this period, as well as those of all other Palæozoic rocks, are distinguished chiefly by having the grooves of the arms running to the mouth in closed channels, and by their rounded stalks. The mesozoic crinoids include the genus *Encrinus*. *E. liliformis* is a well-known Triassic species, these typical encrinites having the joints of their stalks perforated by a small canal, and having the arms composed of two series of alternating pieces. The genera *Pentacrinus* (Lias) and *Extracrinus*, and the *Apiocrinidæ* or pear E. of the Oolitic rocks are well known. The latter are so named from their pear-shaped calyx.

Encyclopæ'dia (Gr. *enkuklios* and *paideia*, lit. 'a circular course of education'), a work meant to treat, generally in alphabetic order, of the whole circle of knowledge. Aristotle was the first who saw the connection between all branches of knowledge, but his idea was not embodied in the form of an E. for ages, as the works of Pliny, Varro, and Suidas are unsystematic compilations. Albertus Magnus (1193-1280) made a collection of remarks on scientific facts which bears closer resemblance to an E., but a more clearly encyclopædic work was the *Speculum Naturale Morale Doctrinale et Historiale* of Vincent de Beauvais, (1264) compiled from Aristotle and Aquinas. In the 13th c. the idea of throwing knowledge into encyclopædic shape seems to have been common, from the number of works then written with the title *Summa* or *Universitas*. The chief of such books was Roger Bacon's *Opus Majus*, a summary of the knowledge of his times, and the introduction to an E. on a larger scale, the *Compendium Philosophiæ*, which was never finished. Whewell calls the *Opus Majus* the E. and the *Novum Organum* of the 13th c. In the 16th c. the encyclopædic idea again became active. Ringelberg published at Basel the earliest work entitled a Cyclopædia, which was followed by similar compilations, the best being Alsted's *E. Scientiarum Omnium* (1620), a collection of treatises giving special attention to grammar, rhetoric, and logic. Two remarkable French works belong to this period, the *Grand Dictionnaire Historique et Critique* by Louis Moreri (10 vols. Lyon, 1674), and the still better known *Dictionnaire* by Bayle (2 vols. Rotterdam, 1696). The very earliest attempt to gather the body of science and art into lexicographic form was probably made by Hoffmann in his *Lexicon Universale* (2 vols. Basel, 1677). This was followed by Thomas Corneille's *Dictionnaire des Arts et des Sciences* (2 vols. Par. 1694), and Coronelli's Italian *Biblioteca Universale* (45 vols. Venice, 1701). In 1706 appeared the *Lexicon Technicum* of Dr J. Harris (Lond. 1706), and in 1727 Ephraim Chambers's *Cyclopædia* (Lond. 2 vols.), which suggested the great French E. (See ENCYCLOPÉDISTS.) Of encyclopædias issued since Chambers's, the most noteworthy are Barrow's *Universal Dictionary of Arts and Sciences* (1751), *E. Britannica* (Edinb. 1st ed. 3 vols. 1771, 9th ed. 1876), Brewster's *Edinburgh E.* (18 vols. 1810-30), the *Encyclopædia Metropolitana* (30 vols. 1818-45), the *London E.* (24 vols. 1826), *Penny Cyclopædia* (27 vols. 1833-43), Knight's *English E.*, based on the *Penny* (22 vols. 1853-61), *Chambers's E.* (1st ed. 1860, 10 vols., new ed. 1874). Of French encyclopædias, besides Diderot's famous *Encyclopédie* (28 vols. Par. 1751-72), the chief are the *Encyclopédie Méthodique* (1782-1852, 201 vols.), *Encyclopédie des Gens du Monde* (22 vols. 8vo, 1833-44), *Encyclopédie Moderne* (1846-62, 42 vols.), *Dictionnaire de la Conversation et de la Lecture* (52 vols. 1834-39), *Biographie Universelle* (1st ed. 1811, new ed. 1854), *Nouvelle Biographie Générale* (46 vols. 1862-70). The chief German encyclopædias are the *Œconomische Encyclopedie* (242 vols. 1773-1858), the *Conversations Lexicon* (1st ed. 8 vols. 1796-1809, new ed. 17 vols. 1865), Meyer's *Grossem Conversations Lexicon* (44 vols. 1840-55), and, above all, Ersch and Gruber's colossal undertaking, the *Allgemeine Encyclopädie der Wissenschaft und Künste* (1818-76, still unfinished). Those of America are the *E. Americana* (14 vols. Philad. 1829-46), the *New American Cyclopædia* (16 vols. New York, 1858-64), Schemnis' *German-American E.* (11 vols. 1869), and Johnston's *Universal Cyclopædia* (4 vols. 1878). Others are Mellado's Spanish *Enciclopedia Moderna* (34 vols. Madr. 1848-51), the *Nordisk Conversations Lexikon* (5 vols. Copenh. 1858-64), *Svenskt Konversations Lexikon* (Stockh. 1845), Rieger's *Slovnik Naučny* (vols. i.-v., Prague, 1860-65). The enormous Chinese E. in 5020 vols., entitled *Ku tu shu tseih ching*, also merits notice. See *The Academy*, February 9, 1878.

Encyclopé'dists, the name given to a French school of writers, from their contributing to the great encyclopædia of the 18th c. edited by Diderot. A project of translating Ephraim Chambers's English encyclopædia having failed, Diderot resolved to form a new and far ampler work, the plan of which was matured between 1745 and 1748, the first volume appearing in 1751, and the last in 1765. The foremost authors of the time contributed to the book; among others, Diderot, D'Alembert, Voltaire, Montesquieu, Turgot, Grimm, Rousseau, Marmontel, Daubenton, Jaucourt, Haller, Du Fresnoy, and Condorcet. There was great variety of belief among these, some being deists, others materialists, others pantheists; and no consistent attack was made on Christianity throughout, though the Catholic priesthood was boldly assailed. This encyclopædia was the first great embodiment of the sceptical and revolutionary spirit, of which it became a most potent organ. Though not pledged to any social theory, and the vehicle of no new social facts, the book, by its clear statement of existing evils, prepared the way for their abolition. It presented the latest scientific results, gave great space to practical arts and industries, but contained no articles on biography or history. See La Porte's *Esprit de l'Encyclopédie* (Par. 1768), Voltaire's *Question sur l'Encyclopédie* (1770), and Taine's *Ancien Régime* (1876).

Endem'ic (Gr. *en*, 'among,' and *dēmos*, 'the people'), a term applied to diseases to which the inhabitants of any country are peculiarly subject, and which proceed from local causes and conditions. When from any cause in the manners and customs of a people, or in their local surroundings, the general health of a community deteriorates, an E. disease is the result. Diseases peculiar to certain localities are, in some way or other, connected with terrestrial and climatic influences, the most marked type of diseases of this class being ague or intermittent fever. E. disease may be caused by unavoidable influences, such as solar heat, the density and electricity of the air, low-lying or elevated situations; or by remediable causes, as swampy districts, luxuriant and decaying vegetation, and by the habits of the people, giving rise to miasmatic and filth diseases. E. diseases are caused also by errors in diet, and principally by the use of contaminated drinking water. Many E. diseases are preventable. Even those of miasmatic origin may be checked by drain-

ing and cultivating the soil, as has been done in the Tuscan Maremma. E. diseases, as a class, are not communicable from man to man like epidemic diseases, although the latter class of diseases are said to be E. in certain countries. In the tropics, the principal E. diseases are malarious fevers, dysentery, diarrhœa, cholera Asiatica, specific yellow fever, and hepatic affections. In the temperate disease realm, zymotic and constitutional diseases cause the greatest mortality; *leprosy* and *elephantiasis* prevail in Scandinavia; *pellagra* in Italy, France, and Spain; *plica polonica* in Poland and Tartary; *goitre* and *cretinism* in Switzerland. Sanitary improvements in civilised countries are rendering E. diseases less frequent, and even phthisis has been shown to be, in great measure, preventable.

End'erby Land, an extensive tract of land in the Antarctic Ocean, lat. 67° 30′ S., long. 50° E., discovered by Biscoe in 1831, and now understood to be an island. Morrell, in 1827, found drift-ice close to the S. of E. L.

Ender'mic Medica'tion, a mode of administering medicines through the skin, as in neuralgia, skin-diseases, the reduction of tumours, &c. Constitutional effects often result from E. M., as salivation from mercury applied in this way.

En'dive (*Cichorium endivia*), a species of Composite plants belonging to the *Cichoraceæ* or Lettuce section of the order, also known as the 'garden succory.' It is a native of China, but grows well in our gardens, where it is sown in May, and survives through the winter. A salad is made of the leaves.

End'licher, Stephen Ladislaus, was born at Presburg, 24th June 1804, studied at the universities of Pesth and Vienna, and devoted himself to the study of botany and of Eastern languages. In 1828 he held a post in the imperial library at Vienna, in 1836 became keeper of the museum of natural history, in 1840 Professor of Botany in the High School of Vienna, and director of the Botanic Garden. He contributed greatly to the establishment of the Academy of Sciences (1846). The political movements of 1848 affected him so strongly that he committed suicide, 28th March 1849. Among his works are *Genera Plantarum*, in Latin (Vien. 1831 41); *Grundzuge der Botanik*, written conjointly with Unger (Vien. 1843); *Synopsis Coniferarum* (Zür. 1847); *Anfangsgründe der Chines. Grammatik* (Vien. 1845), and *Atlas von China nach der Aufnahme der Jesuitenmissionare* (Vien. 1843).

Endocardi'tis, an inflammation of the serous membrane, or endocardium, covering the valves and internal surface of the heart. See HEART, DISEASES OF.

Endocar'dium (Gr. *endon*, 'within,' and *kardia*, 'the heart'), the lining membrane of the heart. See HEART.

En'dogens, or **Endog'enous Plants** (Gr. *endon*, 'within,' and root *gen*, from *gignomai*, 'to be born'), a great natural division of the vegetable world, characterised by the *inward growth* of the stem. The term is used chiefly in opposition to Exogen (q. v.). Endogenous plants possess only one seed-leaf, and the name *Monocotyledonous* is therefore used synonymously with E., whilst the leaves of E. show a *parallel venation* or arrangement of their veins. In their growth also E. differ from the higher exogens. The *radicle* or young root of the E. divides into numerous fibres, which, as they pass outwards, are covered by a thin sheath or *coleorhiza*. The roots are hence called *endorhizal*. The stem of any endogen (well exemplified by palms, bamboos, grasses, lilies, &c.) shows no division into layers of pith, wood, and bark, as in the stem of an exogen. No concentric woody circles, nor *medullary rays* running between the pith and circumference, are to be seen. The bark of an endogen cannot be separated from the wood, and exhibits no annual increase as in exogens. The bundles of vessels are also diffused through the tissues of the endogenous stem without any definite arrangement. The stem is composed of cells in its young state, but afterwards of bundles of woody, spiral, and other vessels. The endogenous stem grows therefore by additions to its central portion, the older vessels being pushed outwards; and there seems to be a definite limit to the outward growth of these plants, since, after a certain thickness has been attained, the stem may increase in height but not in thickness. E. possess flowers with stamens and pistils, and the seeds are held in an ovary or seed-vessel. They may be subdivided into the (1) *Dictyogenæ* (in which the leaves have reticulated venation), exemplified by the natural orders *Smilaceæ*, *Trilliaceæ*, and *Dioscoreaceæ*; and (2) the *Petaloideæ* (with parallel-veined leaves and a coloured perianth), represented by the great bulk of E., such as orchids, palms, lilies, grasses, and many other less familiar groups.

Endorse' (Lat. *in*, 'on,' *dorsum*, 'the back'), in heraldry, is an ordinary containing one-fourth of the pale. It is generally borne on the field in pairs.

Endorse. See BILL OF EXCHANGE.

Endow'ment, in English law, is the settling of Dower (q. v.) upon a woman. The term is also applied to a provision for the support of a church, school, charity, &c.

Endrŏd', a village of Békés, Hungary, on the Körös, 92 miles E.S.E. of Pesth. It is situated in a very fertile region, and has a trade in horses, cattle, sheep, grain, &c. Pop. (1869) 8714.

Endym'ion, a youth (variously described as king of Elis, shepherd, or hunter) renowned for his beauty and for the perpetual sleep in which he spent his days. He was greatly beloved by Selēnē (the Moon), who, according to a Carian tradition, lay beside the sleeping E. in a cave of Mount Latmos. The sleep of E. is differently accounted for. Some say it was the gift of Zeus, some a punishment for falling in love with Hērē, others that Selēnē, fascinated by his charms, conveyed him to Latmos, and lulled him to slumber that she might nightly kiss him without reserve. The myth itself has received various explanations. E. is regarded by some as an astronomer, by others as a personification of Sleep. The Eleans showed his tomb at Olympia. Max Müller (*Oxford Essays*, 1856) takes E. as a name of the setting sun (from *enduō*, probably a dialectical variety of *duō*, 'I sink or set'), who goes to sleep in the caves of Latmos (Night), to be followed there by Selēnē, the daughter of Latona (Night). E. is the subject of Keats' longest poem.

En Échelon. See ÉCHELON.

En'ema. See CLYSTER.

En'emy. Originally every subject of a belligerent state was said to be the E. of every subject of the opponent state, and everybody's property was liable to confiscation; but now a distinction is made between combatants and non-combatants. An E.'s subjects, resident in the country declaring war, generally get notice to depart. An E.'s property within the country, debts due by an E.'s subjects, and even public stocks held by the government, are now seldom confiscated. Non-combatant enemies, if they resist, are liable to severe punishment from the home government, and whatever plunder they take is forfeited to the public. On the other hand, their property within their own territory is partially protected, though on sea it is subject to capture. Accordingly there has always been more freedom for private exertion at sea. There was a system of issuing letters of *marque* (*i.e.*, licenses to cross the boundary) from the belligerent government which gave a right to the thing captured, and were recognised by the E. as authorising war. Privateering has been stipulated against in certain treaties, and the Declaration of Paris (30th March 1856) declares privateering abolished. War on land is growing more humane. Formerly, an army pillaged in order to live. Now no commander severs his connection with his base whence his supplies come. The separation of the army from civilians has had a good effect, having strengthened discipline, and reduced war to a science. But the deeper changes, such as the abandonment of killing or enslaving prisoners, have arisen from the growth of intelligence and sympathy. Though the modern tendency is to excuse anything that does wholesale execution, infernal machines, constructed to produce a frightful moral effect by severe wounding or mutilation, are now little resorted to. The use of savage allies has always been criticised; but in 1848 the Russians brought Circassians into Hungary, and the Turks employed them in the insurrectionary wars of 1876. Systematic pillage was practised in the Thirty Years' War, and by Turenne and Catinat under Louis XIV. The substitution of fixed contributions in certain districts dates from the campaigns of Villars and Marlborough. Contributions were discountenanced by Wellington, were unknown in the Crimean War, and were paid for by the Germans in 1870. Military stores and buildings are held lawful plunder, and may be destroyed. In sieges a distinction is now made between forts and fortified towns: some generals

do not bombard the latter, except after notice to the inhabitants. It is often difficult to fix the line where rebels become entitled to the privileges of combatants. Peace is generally adjusted by definitive treaties, very often qualified by secret articles. Such treaties are often acceded to or protested against by neutral powers. These documents were in Latin till, in the 18th c., French became the *lingua franca* of diplomacy.

Ener'gico (Ital. 'with energy'), a mark of expression in music.

En'ergy (Gr. *energeia*, from *en*, 'in,' and *ergon*, 'work') is the capacity which a material system possesses for doing work, *i.e.*, for overcoming resistance. A stone ascending into the air against the gravitating attraction of the earth, a bowl rolling with ever-decreasing velocity along the ground, the slow onward and downward grinding of a glacier, all indicate the existence of E.; for all moving bodies possess power of doing work in virtue of their motion. But a raised weight, a drawn bow, a stretched piece of india-rubber, a quantity of compressed air, a heated body, a charged electric conductor, &c., also have each a certain capacity of doing work, though there is no evident motion. We thus recognise two apparently distinct forms in which E. is made evident, viz., that of motion, or *kinetic E.*, and that of configuration, or *potential E.* Now, the working power of a moving body must increase with both the mass and velocity, but must further be quite independent of the *direction* of motion. These, conjoined with other considerations more mathematical, lead to the definition of kinetic E. as half the product of the mass into the square of the velocity ($K = \frac{1}{2} m v^2$). For a clearer comprehension of potential E., take the case of a raised weight—say a weight of 10 lbs., at a height of 50 feet. The work which is stored up in it, and which it could perform if allowed to fall to earth, is estimated at 10 × 50 = 500 foot-pounds—where a foot-pound is the amount of work which must be expended upon a weight of one pound so as to raise it through a distance of one foot at the surface of the earth. This stored-up work, valued at 500 foot-pounds, is a measure of the potential E. We may then define the potential E. of a given material system, at any instant, as the amount of work stored up in that system during its passage from a certain configuration to the configuration it has at the instant in question. We find, on a close investigation of any physical phenomenon, that kinetic and potential energies are mutually transformable. Thus an ascending stone is continually losing in kinetic and gaining in potential E.; a descending stone the converse. The potential E. of a bent bow is made evident in the rapid flight of the arrow; the bowl derives its motion from the E. stored up in the muscle of the bowler; the heated body generates aerial currents, and raises the temperature of surrounding bodies; the charged conductor may give rise to a variety of motions—light, heat, sound, &c.—or may make a part of its E. sensible as an electric shock. From these few examples it will be seen what a wide significance in science the term E. has. Under it we study the nature, the effects, and the relations of the formerly so-called *imponderables*—light, heat, electricity, &c.; we investigate all phenomena of attraction and repulsion existing in the physical universe; we trace results through their varied transformations back to some known principle, thus rendering the whole science of natural philosophy more and more the vast and coherent structure which it should be, and which has for its foundation the grandest of modern generalisations—the *conservation of E.* This principle may be thus enunciated:—The total E. of the universe, or of any portion of it, uninfluenced save by its mutual actions, is *constant* throughout all transformations. It is this indestructible and non-creatable character which most warrants us in conceiving E. as something which has an existence as real and objective as matter; and it is utterly opposed to the possibility of perpetual motion, taken in its purely scientific sense of doing work without an expenditure of an equivalent quantity of E. The experimental basis for this generalisation is that any one form of E. may, by suitable means, be transformed wholly or in part into an *equivalent* amount in any other form. This constitutes the *transformation of E.* These principles were fully recognised, in their purely *mechanical* connections, by Newton; but they have only been developed during the last thirty years. The following are a few of the innumerable experiments given in illustration of the mutual relations and interactions of the various forms of E.

An oscillating pendulum, when at either extremity of its range, has no kinetic E., but its potential is evidently at its greatest. As it approaches the vertical position, it loses in potential E., but simultaneously there appears an equivalent amount of kinetic E., which again diminishes as the bob rises. There is a constant transformation of active and dormant energies; and the most delicate measurements bring out the conservation principle, that the sum of the two is constant, or rather would be if the pendulum could possibly be suspended absolutely frictionless in a non-resisting medium. The length of the arc of oscillation, and the time of description, would in such a possibility be invariable; and any alteration in either discovers to the inquirer the action of some extraneous force. There is no pendulum but is constantly losing some of its E. in the resistances offered to its motion, and this loss has its equivalent in the heat ultimately generated by the friction. A vibrating tuning-fork presents another interesting and somewhat analogous case. Its E., depending upon the original displacement and the elasticity of the metal, is rapidly transformed into the aerial waves of compression and dilatation which constitute sound, and these, as with all similar phenomena, ultimately find their equivalent in the heat generated by the motion. In all instances the equation $K + V =$ const. is the great governing principle—where K is the kinetic, and V the potential E. The potential E. of the bent bow, stored up in it by the muscular exertion of the archer, is transformed into the kinetic E. of the projected arrow, which is gradually spent in overcoming the resistance of the air, and at length lost when the arrow strikes any object, being ultimately transformed into the heat generated by the friction and concussion. Many fine examples are obtained from electric and magnetic phenomena. In the common electric machine, the electricity generated finds an equivalent in part of the muscular E. expended in rotating the cylinder; and the E. of the charge may be used to produce light, sound, and heat, or a shock. In a voltaic battery we have a store of E. due to the difference of potential of the electrodes and the chemical properties of the electrolyte; and part of this E., when the electrodes are connected externally by a wire, is transformed into the kinetic form of an electric current, which, on account of the resistance to its passage presented by the circuit and battery, generates heat in both, the amount of heat generated having an equivalence in the loss which the E. of the current suffers. If a very thin wire be used in the circuit, the resistance to the current may be so great as to generate an amount of heat sufficient to make the wire glow, or even melt. Dr Joule of Manchester found by experiment that, *ceteris paribus*, the total quantity of heat ultimately generated in a circuit was proportional to the square of the intensity of the current, and that, if the current were used to drive a magneto-electric engine, and do work, say by raising a weight, the heat produced would be less than when no such external work was done, by an amount which has its mechanical equivalent in the work performed, and therefore in the potential E. stored up in the weight and the loss occasioned by friction, molecular forces, &c. If this raised weight be permitted to fall, the potential E. is transformed first into kinetic, and this ultimately finds its equivalence in the heat generated by the concussion. Dr Joule showed that a weight of 1 lb. falling through a distance of 772 feet was sufficient to generate a quantity of heat capable of raising the temperature of 1 lb. of water, at ordinary temperature and pressure, by 1° F.; and this amount of work, 772 foot-pounds, is the so-called *mechanical equivalent* of heat. This experimental law, disproving conclusively the material nature of heat, forms the foundation of the true science of Thermodynamics (q. v.), with the development of which that of E. is connected indissolubly. Arago's discovery of the retarding effect of a copper plate upon a magnetic needle set in vibration over it is completely explained in accordance with conservation principles, as a consequence of Faraday's later discovery of the induction of electric currents in a conductor moving relatively to a magnet. The currents generated react upon the magnet, the loss of whose E. has its equivalent first in the E. of the induced currents, and ultimately in the heat produced by resistance to conduction. Oersted's discovery of electro-magnetism, followed up by Faraday's brilliant researches, affords many interesting cases of transformations, indicating the close connection existing between electricity and magnetism. Later, Ampère produced all the phenomena of magnetic repulsion and attraction by means of solenoids or helices of conducting wires, establishing the law that *two currents flowing in the same direction attract each other; two*

currents flowing in opposite directions repel. The induction of a secondary current in a coil moving relatively to the primary coil, viewed in the light of this law, affords a beautiful example of conservation of E., inasmuch as the secondary current flows in the same or in the opposite direction as the primary, according as the coils are receding from or approaching each other. For were the secondary current to flow in a direction opposite to that of the primary while the coils were being separated, there would be repulsion, and the coils would *of themselves* tend to separate more and more rapidly with the generation of a constantly increasing secondary current—a case of perpetual motion, or work done without expenditure of E. Similar reasoning has of late years led to the discovery of new and sometimes startling facts. One of the most remarkable is the calculation upon theory by Professor James Thomson of the lowering of the freezing-point of water by pressure, and the subsequent experimental verification, even to its numerical details, by Sir W. Thomson. The latter extended the theory further in this direction, and deduced the interesting law of which the above is a special case, that solids which *expand* when melted have their melting-point *raised* by pressure, and solids which *contract* when melted have their melting-point *lowered* by pressure. For the application of this law to the explanation of physical phenomena, see EARTH and GLACIERS. Another discovery by Sir W. Thomson is the so-called *electric convection of heat*, or the effect produced by a current directed through an unequally-heated metallic wire or bar—tending to equalise the temperature in some metals, as in the case of iron, and to render it still more unequal in others, as in copper. In electrolysis we have the E. of the electric current expended in dissociating the molecules whose combination forms the electrolyte; and the researches of Faraday show that the more hidden actions of chemical combination and decomposition are as truly governed by this law of conservation as the more evident motions of the solar system. Experiment shows that there is always a definite amount of heat taken in or given out during the formation of a given quantity of a chemical compound; and further, that a compound, if capable of being decomposed by heat, requires to give out or take in precisely the same amount to effect its decomposition.

Throughout all these illustrations, however, it is noticeable that the form of E. which is most frequently, indeed always, produced is heat. Now one of the most evident properties of heat is its tendency to diffuse itself in all directions, and thus ultimately render all bodies of one and the same temperature. But mechanical work can be obtained from heat only when it is capable of being transmitted from one body to another, *i.e.*, when we have two bodies at *different* temperatures. Evidently, then, heat tends, when left to itself, to destroy its power of doing useful work. In other words, though the amount of E. is constant, its *availability* for work is diminishing; and thus are we led to Thomson's most recent development of the science, viz., the *dissipation of E.* It simply asserts that no natural process is reversible, and that all transformations are accompanied by a constant degradation of E. to the final unavailable form of uniformly-diffused heat. Hence if, as suggested by Professor Tait of Edinburgh, we take the word *entropy* to mean availability for work of a given quantity of E., we are led to the conclusion that the 'entropy of the universe tends to zero.' Heat can only do work when it is let down, so to speak, from a hotter to a colder body—just as a mass of water, however great, is useless unless it can be let down from a higher level to a lower. Further, the greater the difference of temperature between the boiler and condenser of a heat engine, the greater is the amount of work the engine is capable of performing as the boiler is cooled to the temperature of the condenser. For instance, suppose a body to contain q units of heat at temperature t, measured from absolute zero, then the total amount of E. which it contains is in dynamical units Jq, where J is Joule's equivalent. If T be the lowest temperature to which the body can be cooled, the greatest possible amount of work which can be performed during the cooling is $J\frac{t-T}{t}q = Jq - J\frac{T}{t}q$, from which we see that the whole heat in a given body cannot be fully utilised except the body be cooled to absolute zero, a practical impossibility. A very good example of this dissipation is afforded by an experiment made by Joule. He compressed a quantity of air to 1·20th of its original volume, in a vessel which was connected with another vessel of equal size, but separated from it by a very perfect stopcock. When the stopcock was turned, the air of course rushed from the one vessel into the other, which had previously been made as perfect a vacuum as possible. This air did no external work, because experiment showed that by whatever amount the temperature of the one vessel fell off, by practically the same amount did the temperature of the other rise. But though the E. remained the same, the entropy was diminished, because now the same mass of air was at only half its original volume. If there were no dissipation of E., every natural phenomenon would be reversible, *i.e.*, would be capable of going over its various stages in the reverse order, fulfilling at each instant exactly the same conditions as in its original progress. But on account of the tendency which heat has to diffuse, very few instances in nature can be adduced which are even approximately reversible; and so unless it be possible to localise or prevent the diffusion of a given quantity of heat, we are compelled to accept the dissipation principle as an important law in nature. Professor Clerk Maxwell of Cambridge has shown, upon the molecular theory of gases, that the localisation could be effected if the molecules of matter were of sufficient size to be individually directed by physical means. The excessive smallness and great number of the molecules, however, render this impossible, and thus shut the only door of escape from this principle, overthrowing the whole of that materialism which has of late years been advocated by quasi-scientific sceptics.

E., then, including as it does Electricity, Magnetism, Gravitation, Heat, Light, Sound, &c. (q. v.), must be recognised as *the* agent in the physical universe—matter being in itself passive and merely the vehicle by which E. is made evident. The most plausible speculation regarding the ultimate nature of matter is that which supposes the atoms to be vortex rings in a perfect homogeneous fluid. (See VORTEX.) If we suppose this fluid to be almost but not quite frictionless, we see that the atoms may be but forms of E., and that ultimately matter may cease to exist, an equivalent portion of hidden E. reappearing as each vortex disappears. Regarding the more hidden properties of E., experiment suggests the following hypotheses as highly probable:—That transformations of E. take place through a medium, which, according to Sir W. Thomson, must have an appreciable density to fulfil the requisite conditions for the propagation of light, radiant heat, and magnetic action; and that potential E. is really kinetic, being due to motions of displacement of some nature through the ether, as the medium has been called.

In conclusion, be it remembered that the theory of E. is still in its infancy. Grove's *Correlation of the Physical Forces* (1842) was the first step in this direction; but under the care of such men as Thomson, Rankine, Helmholtz, Joule, Clausius, Maxwell, &c., the science has grown so rapidly, and has opened up such important lines of research, that it has established the whole of natural philosophy upon a new and firmer basis. The researches of Faraday have done more towards this than all other previous discoveries put together; yet it is a curious fact that this distinguished experimentalist never fully appreciated or recognised the potency of the principle of the conservation of E. The most popular work on the subject is Balfour Stewart's *Conservation of E.* (1874); but for a more scientific treatment, see Helmholtz's *Ueber die Erhaltung der Kraft* (1847), Tait's *Thermo-Dynamics* (1868), and the numerous scattered papers of Thomson, Rankine, and Clausius in the *Transactions* and *Proceedings* of the Royal Societies of London and Edinburgh, in the Cambridge *Philosophical Transactions*, *Philosophical Magazine*, &c. The principles are applied on every occasion in such works as Thomson's and Tait's *Natural Philosophy* (1867), Thomson's *Electrostatics and Magnetism* (1873), Clerk Maxwell's *Theory of Heat* (1871), and *Electricity and Magnetism* (1873), Rankine's *Steam-engine* (1859), and Tait's *Recent Advances in Physical Science* (1876).

En'fantin, Barthélemy Prosper, 'Père,' was born at Paris, February 8, 1796. He was expelled from the École Polytechnique for having taken part in the 'national defence' at Montmartre in 1814. For some years he was a bank clerk, and in 1825 was introduced by Rodriguez to the dying St Simon. Later, E., along with Rodriguez and Bazard, the head of the French Carbonari, started a journal, the *Producteur*, in which they explained St Simon's views, calling themselves the 'Supreme Fathers.' E. divided all human characters into the con-

stant and the variable, the profound and the superficial. He advocated 'free love,' subject to the discretion of the priest or spiritual authority. Personal beauty was essential to the priest, and woman was the Messiah to proclaim this new theory. After a split in the sect, E. was called by his preachers—Barrant, Transon, Laurent, &c.—'the living law,' while the *Globe* newspaper argued that the salvation of society depended on the recognition of E. as Pope. In 1832 the society was put down by Government, and E. was imprisoned for conspiring against public morality. He afterwards lived in seclusion for some years, but was a member of the Algerian Scientific Commission of 1841, and edited the journal *Le Crédit Public*, 1848–50. He died 31st May 1864. E. wrote many socialistic works; among the latest, *La Vie Éternelle, Passé, Présente, Future* (1861). E.'s works, along with those of St Simon, were published in 20 volumes (1865–69) by a council of followers.

En'field, a town in Middlesex, 10 miles N.E. of London by railway, celebrated as the seat of the Government small-arms factory. It belonged to the crown till the time of James I., and there was here an extensive royal chase, disforested in 1729. Pop. (1871) 16,054.

Enfilade' (Fr. *enfiler*, lit. 'to thread,' hence 'to take in line') is to sweep any line of works or of troops with shot from a battery placed on the prolongation of such line. An E. is evaded by constructing works so as to present angles to the enemy's fire, and on the side of the attack by advancing to these works in zigzag trenches.

Enfran'chise (Fr. *franc*, Ger. *frank*, 'free'), to liberate, to confer on a person free privileges, as of voting in a constitutional government, &c. It also means to *naturalise*.

Engadine' (*Encò d'Oen*), a valley in the E. of the canton of Grisons, Switzerland, is watered by the Inn, and has a length of 43 miles. It extends in a north-easterly direction between the Lepontian and Rhætian Alps, and is divided into the Lower E. in the N., an inclement ravine, clad with cembra pines, and the Upper E. in the S., a smiling meadow-land 4000 feet above the sea. The chief places in the former are Zernez and Tarasp; in the latter, Silvaplana, St Moritz (a sanatorium), Samaden, &c. The Engadines are of Latin origin, and speak a Romanic tongue (*Ladin*). They usually pass a portion of their lives in the large European towns, chiefly as hawkers and confectioners, invariably returning to their native valley. Pop. about 8000, almost all Protestants. See Papon, *Das E.* (1857), and Von M. Caviezel, *Das Oberengadin* (Samaden, 1876).

Engage'ments, Military and Naval, are hostile encounters between armies and fleets or divisions of these. The nature of these conflicts has been continually changing. The primitive manœuvres were upset by the invention of gunpowder, and warfare has in recent years been again revolutionised by the stricter study of tactics and by the vast improvements in cannon and small arms. See DRILL (MILITARY), ÉCHELON, CAMP, &c.

Engagements, Unlawful. By 37 Geo. III. c. 123, the administering an oath, or otherwise attempting to bind any one to any illegal purpose, is made felony. Compulsion (q. v.) will not excuse any one taking the oath unless he disclose the circumstance to a Justice of the Peace or Secretary of State within fourteen days. An oath not to reveal an unlawful combination has been held to come within the statute. See COMBINATION.

Enghien', Louis Antoine Henri de Bourbon, Duc d', son of Prince Henri Louis Joseph, Duc de Bourbon, was born at Chantilly, August 2, 1772. He fought with the French Royalists against the Republicans, 1796-99, and after the peace of Luneville, having a pension from England, retired to the château of Ettenheim, in Baden, and was privately married to the Princess Charlotte de Rohan. On the 17th of March 1804 a French force entered the Baden territory, seized E. in bed, and took him to the Castle of Vincennes near Paris, where he was tried by a military court on the charge of being privy to the plot of Pichegru against the life of Napoleon, and having been convicted without evidence, was by order of Napoleon shot in the castle ditch on the 21st of March. Fouché, Napoleon's chief adviser, said of the execution of E. that 'it was worse than a crime, it was a blunder;' Napoleon defended it on the ground that it was necessary to frighten the Bourbons. See Dupin's records of the trial, and Savary's memoir *Sur la Catastrophe de M. le Duc d'E.* (Par. 1823).

En'gine (Lat. *ingenium*, 'natural capacity,' 'invention;' Ital. *ingegno*; Fr. *engin*, 'craft,' 'contrivance'), a term in mechanics, applied in a general sense to any powerful machine, but strictly denoting prime movers. Engines are usually more fully designated in accordance with their special functions, as in the case of a Steam-E. (q. v.). The forces applied and utilised by the various engines are heat, gravity, and electricity. The relation of these forces to useful work is described under THERMO-DYNAMICS, HYDRO-DYNAMICS, ENERGY, &c.

Engineer' and **Engineering'**. The Institution of Civil Engineers, defines E. as 'the art of directing the great sources of power in nature for the use and convenience of man,' and as dealing with 'the construction of roads, bridges, aqueducts, canals, river navigation, and docks for internal intercourse and exchange,' &c. In the widest sense, the E., to use the words of the late Professor Macquorn Rankine, 'is he who makes the mechanical properties of matter serve the ends of man.'

The business of the *military* E. (in distinction from whom others received the title *civil*) is to construct fortifications and military roads and works generally. In India, however, much purely civil work—the construction of railways, canals, bridges, &c.—is still done by military engineers, and throughout the Empire the work of the Ordnance Survey is carried on by them.

The profession of the Civil E. (q. v.) is further subdivided into railway engineers, hydraulic engineers, telegraphic engineers, mining engineers, &c. The civil E. generally only designs and superintends work; the actual making of the railways, bridges, docks, &c., under his care is done by a *contractor*. The mechanical E., on the other hand, usually constructs as well as designs his work. He employs his own workmen—pattern-makers, moulders, smiths, fitters, turners, &c.

The English still hold the foremost position as engineers, in spite of the greatly superior education received by those of Germany and France. England, however, is now rapidly extending the provision for efficient training. Although she has nothing exactly corresponding to the German Polytechnic Schools, most of the universities and colleges (excepting those of Oxford and Cambridge) have established chairs of engineering. The E. requires a knowledge of pure mathematics, mechanics, hydrostatics, hydraulics, dynamics, optics, and drawing. The various operations of the art are treated of in separate articles.

Engineers in the royal navy rank as commissioned officers. They are admitted by examination, and have charge of and control over the engines, boilers, and machinery in general of vessels of war. The principal classes into which they are divided are inspectors of machinery, chief E., and assistant E., the latter being subdivided into first, second, and third class. The pay ranges from £60 to £500.

Engineers, Royal, a regiment or corps of the British army, the special duties of which are the defence and attack of fortified places, and the alteration of existing batteries. The regiment was first incorporated in 1763, the department of military engineering having previously to that date been superintended by officers selected from the army. The distinction of being made a royal corps, with a distinctive uniform, was conferred in 1783. In the army estimates for 1876–77 the corps of R. E. consisted of 392 officers, 721 non-commissioned officers, and 4162 men. Officers of the R. E. require to possess a liberal knowledge of mathematics, mechanics, the theory and practice of construction, and drawing. They enter as cadets, by competition, into the Royal Military Academy, where a course in these branches is pursued, and whence they pass out with commissions. The non-commissioned officers and privates are all skilled workmen in some mechanical calling. The pay of officers and men is considerably higher than in line regiments; and as the Ordnance Survey has been entrusted to the corps, as well as various special Government works, unusual facilities are afforded for advancement.

Eng'land and Wales, the southern and larger portion of the island of Great Britain, is bounded N. by Scotland, E. by the North Sea, S. by the English Channel, and W. by the Atlantic and the Irish Sea, and lies in lat. 49° 51'–55° 45' N. and long. 1° 45'–5° 44' W. The country is somewhat in the form of a scalene triangle, having its base in the S., while its extreme points are in the N. Berwick, S. the Lizard Point, E. Lowestoft Ness in Suffolk, and W. Land's End. Its extreme

length, from Tweedmouth in the N. to St Alban's Head in Dorset, is 365 miles; and its breadth, from Hartland Point in Devon to the S. Foreland in Kent, is 290, while the extent of the coast-line amounts to 2000 miles, giving 1 mile of sea-margin to every 29 sq. miles of surface.

The chief indentations on the W. side are the Solway, Morecambe Bay, Cardigan Bay, St Bride's Bay, Milford Haven, and Bristol Channel; on the S. Mount's Bay, Plymouth Sound, Portsmouth Harbour, and Southampton Water; and on the E. the estuary of the Thames, the Wash, and the Humber. Of the capes may be mentioned, on the E. coast, Flamborough Head and Spurn Head in Yorkshire, the Naze in Essex, the N. and S. Foreland and Dungeness in Kent; on the S. coast, Beachy Head in Sussex, the Needles in the Isle of Wight, Portland Point in Dorset, Start Point in Devon, the Lizard and Land's End in Cornwall; on the W. coast, Hartland Point in Devon, Worms Head in Glamorgan, St David's Head in Pembroke, Braich-y-Pwll and Great Orme Head in Carnarvon, and St Bees' Head in Cumberland. E. and W. are divided into fifty-two counties, with areas and populations as follows, according to the census of April 3, 1871:—

Counties.	Areas in statute acres.	Pop. (1871).	Capitals.
England.			
Bedford	295,509	145,257	Bedford.
Berks	450,132	196,475	Reading.
Bucks	467,009	175,879	Buckingham.
Cambridge	524,926	186,906	Cambridge.
Cheshire	705,493	561,201	Chester.
Cornwall	869,878	362,343	Bodmin.
Cumberland	970,161	220,253	Carlisle.
Derby	656,243	379,394	Derby.
Devon	1,655,161	601,374	Exeter.
Dorset	627,265	195,537	Dorchester.
Durham	647,592	685,089	Durham.
Essex	1,055,133	466,436	Chelmsford.
Gloucester	804,977	534,640	Gloucester.
Hereford	534,898	125,370	Hereford.
Herts	391,141	192,226	Hertford.
Huntingdon	229,515	63,708	Huntingdon.
Kent	1,004,984	848,294	Maidstone.
Lancashire	1,207,926	2,819,495	Lancaster.
Leicester	511,719	269,311	Leicester.
Lincoln	1,767,962	436,599	Lincoln.
Middlesex	181,317	2,539,765	London.
Monmouth	368,399	195,448	Monmouth.
Norfolk	1,356,373	438,656	Norwich.
Northampton	629,912	243,891	Northampton.
Northumberland	1,290,312	386,646	Newcastle.
Nottingham	526,176	319,758	Nottingham.
Oxford	470,095	177,975	Oxford.
Rutland	94,889	22,073	Oakham.
Salop	841,167	248,111	Shrewsbury.
Somerset	1,049,815	463,483	Taunton.
Southampton	1,032,105	544,684	Winchester.
Stafford	732,434	858,326	Stafford.
Suffolk	949,825	348,869	Ipswich.
Surrey	483,178	1,091,635	Guildford.
Sussex	934,006	417,456	Lewes.
Warwick	566,458	634,189	Warwick.
Westmoreland	500,906	65,010	Appleby.
Wilts	859,303	257,177	Salisbury.
Worcester	472,453	338,837	Worcester.
York	3,882,851	2,436,355	York.
	32,597,398	21,495,131	
Wales.			
Anglesey	193,511	51,040	Beaumaris.
Brecknock	460,158	59,901	Brecknock.
Cardigan	443,387	73,441	Cardigan.
Carmarthen	606,172	115,710	Carmarthen.
Carnarvon	369,482	106,121	Carnarvon.
Denbigh	392,005	105,102	Denbigh.
Flint	169,162	76,312	Mold.
Glamorgan	547,070	397,859	Cardiff.
Merioneth	385,291	46,598	Dolgelly.
Montgomery	485,351	67,633	Montgomery.
Pembroke	393,682	91,998	Pembroke.
Radnor	276,552	25,430	New Radnor.
	4,721,823	1,217,135	
Total,	37,319,221	22,712,266	

The principal islands along the English coast are the Isle of Man in the Irish Sea, Walney off Lancashire, Anglesea and Holyhead, Lundy Island in the Bristol Channel, the Scilly Isles off Land's End, the Isle of Wight and the Channel Islands, Sheppey in the mouth of the Thames, and, near Berwick, Holy Island, the Farne Islands, and Coquet Isle. They are described at length under their respective names.

Physical Aspect.—The surface of E. proper is agreeably diversified by hills and plains. The hills are generally steep towards the W., but have a gentle eastern slope. A line drawn N.E. and S.W. from Scarborough in Yorkshire to the mouth of the Severn would divide E. into two portions distinct alike in geology and physical outline. To the N. the surface is broken and hilly, rising occasionally into bold heights; to the S. it is chiefly characterised by gentle undulation, and level, fertile expanse. Extending from the western declivity of the Cheviots in a direction mainly E.S.E., the Pennine chain forms the great watershed of the N. It runs as far S. as the Peak in Derbyshire, and reaches its greatest height of 2927 feet in Cross Fell, Cumberland. The Cumbrian mountains, a cluster of rugged peaks, are a western offset of the Pennine, and include Scawfell, the highest elevation in E., having 3208 feet of altitude. The basin of the Severn is partly bounded on the W. by the Cotswold, and on the E. by the Malvern Hills, while the Cambrian mountains project many spurs over the Welsh frontier. Snowdon, in Carnarvon, 3571 feet, is the highest mountain in E. and W. The Cambrians also contain Cader Idris, Arran Fowddy, the Beacons, &c. Cornwall, Devon, and Somerset are traversed by the almost continuous Devonian ranges, which in Yes Tor have a height of 2050 feet. The other southern ranges are the Dorset Hills, and the N. and S. Downs. To the N. of the Thames, in Bucks and Cambridge, are the Chiltern Hills, which form part of a low, broken chain continuing in a north-easterly direction into Norfolk. The wolds in Lincoln and York are slight elevations parallel with the coast. The E. coast is low, and broken mainly by sweeping bays; on the W. the irregular shores are lined with cliffs, and frequently project in bold and precipitous headlands.

The plains are numerous and extensive. The heart of the country is a great fertile flat, varying in height from 200 to 400 feet, and extending from the Cotswold Hills to the confines of the Wash, from the Pennines to the basin of the Thames. To the N., hemmed in by the Pennines and the Wolds, the Plain of York stretches along the E. coast to the Tweed, and includes many large coal-fields. The Cheshire Plain, in the basins of the Dee and Weaver, lies between the Pennine and Welsh hills. The lowest land in E., the Eastern Plain, is partly separated from the great central one by the Chilterns, and includes the coast country from the Thames to the Wash. It comprises the Fens, the richly productive flats of Lincoln, Huntingdon, Norfolk, and Cambridge. The broad valley of the Severn is celebrated for its rich beauty and fertility. Salisbury Plain in Wilts, and Dartmoor in Devon, are tablelands. The Weald, enclosed by the N. and S. Downs, is a wide pastoral expanse.

Hydrography.—The rivers of E., which are well supplied with water, are of the utmost importance in the various industries, as well as for purposes of irrigation and commerce. By far the greater volume of water flows into the North Sea, the line of water-parting traced from N. to S. falling considerably to the W. of the centre of the country. The drainage area to the E. is 29,759 sq. miles; that to the S. into the English Channel, 7306; and to the W. into St George's Channel and the Irish Sea, 21,255. To the S., and also generally to the W., the streams are short, and their basins narrow. The longest and noblest river in E. is the Thames, the valley of which is famous for its wealth of richly-wooded scenery. Among others conspicuous for length are the Severn, Trent, Ouse, and Great Ouse. The Mersey and Tyne are great commercial and shipbuilding rivers. Among the chief rivers of Wales are the Dee, Teify, Towey, Tawy, Usk, and Wye. As compared with Scotland or Ireland, E. is singularly deficient in lakes. Indeed, the only sheets of water of any size are confined to a portion of Cumberland and Westmoreland known as the 'Lake District.' Windermere, the largest of the English lakes, is not more than 10 miles long and 1 broad, with an area of 3 sq. miles. Another small lake is Bala, in Merioneth, N. Wales.

Climate.—Its insular position secures to E. a mild, moist climate and an unusually equable temperature. The parallel of latitude that passes through the heart of E. also traverses Labrador on the W., and Central Russia on the E., where the winters are colder by some 30° F. Free from the extremes of heat and cold to which continental countries are exposed, the mean tempera-

ture of E. in January is about 39° F., in July 62°. The W. side is particularly mild, being visited in summer and autumn by the prevailing W. and S.W. winds which bear across the Atlantic the warm air generated by the 'Gulf Stream' of Florida. Cold N. and easterly winds alternate during winter and spring, and tend to reduce the temperature of the E. side. Rain falls in greatest quantity with W. and S.W. winds; those from the E. or N. are generally either dry or foggy. The distribution of rain is very unequal, being most abundant in the W., and gradually decreasing towards the E. At Seathwaite in Borrowdale, Cumberland, the annual fall amounts to 134 inches, while the average along the W. coast ranges from 40 to 80 inches; whereas on the E. coast the average is from 23 to 30 inches—at London 24, at Cambridge 20, at York 23, at Newcastle 25. The mean number of rainy days on the E. coast is 165, on the W. 208. This difference is partly owing to the configuration of the land, partly to the prevalence of westerly winds charged with vapour from the Atlantic.

Geology and Mineralogy.—By far the greater portion of the surface of E. is of sedimentary, fossiliferous strata, reaching back to the Cambrian. Only the north-western and south-western counties are covered by the older Palæozoic formations. The north-eastern portion has a basis of carboniferous limestone, which extends intermittingly S. and W. into Devonshire, and contains the Cornish lead-ores. Above the limestone lie the coal formations, beginning in Northumberland, and continuing through Durham, York, Lancashire, and Stafford, into S. Wales. The coal deposits support the new red sandstone and magnesian limestone, which stretch in a narrow belt from Shields to Warwick, abounding in salt and gypsum in some localities. To the E. again of the coal and sandstone districts, the Oolite and Lias formations occupy the country, extending in a wavy line from the E. coast of Dorset to Whitby. Further E. these are succeeded by greensand and chalk, and the Wealden beds of Sussex. The Tertiary series and Diluvial clays are mainly confined to the basins of the Ouse and Thames. Wales consists for the most part of Cambrian and Silurian strata; the coal measures in the S. are very extensive. Proceeding from N. to S., the various formations in E. and W. appear in the exact order of geological arrangement, thus as it were presenting to view a complete geological section of the earth's crust.

The minerals of E. constitute a main element in her industrial prosperity, and in proportion to the area greatly surpass those of any other country. The vast supply of fuel in the coal basins of Northumberland, Lancashire, Durham, Warwick, Stafford, and S. Wales, has led to the growth in these localities of immense and flourishing manufactures. Wales, Stafford, and Yorkshire are the chief sources of iron ore. As in remote times, tin is supplied by the Devonian and Cornish mines. Cornwall is also most plentiful in copper, which occurs besides in Stafford, &c. In Derby, Somerset, and Cumberland, lead is found, and some quantity of silver is extracted from the ore. Plumbago is procured in a pure state in Cumberland, Borrowdale. Solid salt is mined in Cheshire to the extent of over 1,000,000 tons in a year. Among the other more valuable natural products are zinc and nickel, arsenic and manganese, potter's clay, granite and freestone.

Botany and Agriculture.—The flora of E. generally belongs to Schouw's N. European region, and closely resembles that of Germany, comprising but few peculiar species. E. is not regarded by botanists as 'a centre of vegetation,' but as having been overrun by a series of vegetable migrations, reaching back, according to Edward Forbes and others, to the Middle Tertiary epoch, when Britain formed part of the continent of Europe. The oak, the king of native British trees, is grown extensively for the building of men-of-war in the 'wealds' of Sussex, Kent, and Surrey. Among the other useful indigenous forest trees are the fir, birch, beech, ash, alder, elm, hazel, willow, yew, maple, aspen, and holly. Of those introduced by man are the chestnut, lime, walnut, Norwegian spruce, larch, Lombardy poplar, mulberry, cedar, and weeping willow. The surface is now well wooded, and royal forest-lands are reserved for the growth of timber. Of these, the largest are the New Forest in Hampshire, Sherwood in Notts, and the Dean Forest in Gloucestershire. There is a great variety of fruit-trees, of which the chief are the apple, pear, cherry, plum, peach, walnut, currant, and gooseberry. A rich appearance is given to the rural scenery of E. by the hawthorn hedgerows, with their wealth of wildflowers, at times overtopping the bosky lanes.

The soil is not on the whole naturally fertile. A considerable portion of the surface is covered with marshy plains, sand downs, and rugged hills. Industry and science, however, are rapidly vanquishing every obstacle, and even at the present time E. holds the first place among the countries of the world in regard to productiveness and the development of agriculture. In part this is due to the study of agricultural chemistry, and thorough systems of drainage, but partly also to the facilities for intercommunication, which so essentially second the efforts of the farmer. Of the 37,319,221 acres constituting the area of E., there were 26,837,125 under cultivation in 1875—8,040,721 under corn crops, 2,979,558 in green crops, 2,968,702 clover, sanfoin, and grasses in rotation, and 12,202,596 of permanent pasture. In the same year the cereal crops were in the following proportion:—Wheat 3,240,344, barley 2,244,867, oats 1,659,121, potatoes 364,982, and turnips 1,639,375. Other cultivated plants are hops, flax, beans, pease, beet, hemp, &c. Wheat, which thrives at an elevation of 1000 feet, is chiefly grown in the S. and E.; barley mainly in the central districts. Oats form the principal crop in the N., where they are cultivated to a height of 2000 feet above the sea. Middlesex and the neighbouring counties produce hay of a celebrated quality. The rearing of hops is mainly confined to Kent and Sussex, while the south-western counties are noted for their extensive orchards.

Zoology and Live Stock.—The existing orders in E. represent a mere fragment of her former mammalian fauna, as indicated in the epoch of the Boulder Clay. They are limited to some sixty species, and comprise the fox, dog, weasel, ermine, badger, otter, polecat, marten, hedgehog, mole, shrew, nine species of bat, the squirrel, hare, rabbit, three species of mouse, two of rat, and four of arvicola. Several species, as the beaver, bear, wolf, wild ox, and wild boar, have been extirpated during the historical era. In the Miocene period we have animals of vast size, as the great elk, the rhinoceros, elephant, hippopotamus, and also tigers, hyænas, crocodiles, &c. Birds are comparatively numerous, the total number of species amounting to 274. Among these the most remarkable are the eagle, hawk, falcon, cuckoo, woodpecker, goatsucker, kingfisher, and nightingale. The peacock, common fowl, turkey, and pheasant are immigrants. Some 260 kinds of fish are found in English seas, rivers, and lakes. Conspicuous among these are the sturgeon, ray, salmon, trout, herring, pilchard, pike, cod, mackerel, turbot, eel, and whiting.

The rearing of live stock is an important branch of English industry. In 1875 there were 4,869,744 cattle in E. and W., and of that number about one-fourth is slaughtered annually. Devon, Durham, Hereford, Suffolk, and Sussex produced the most esteemed breeds. In Cambridge, Dorset, and Essex large quantities of butter are made, while Cheshire, Devon, Gloucester, and Wilts are celebrated for their cheese. The number of sheep in 1875 was 22,066,444, divided into two main breeds, those yielding wool of short and of long staple. The latter are chiefly reared along the E. coast as far N. as Tees Water, the former in the southern counties. English horses are noted both for draught and pace. The estimated number is 2,000,000, of which (1875) 1,156,487 were employed solely in agriculture. Hogs are numerous in the forest lands of Berks, Gloucester, Hereford, and Hampshire, the bacon from the last-named place being famous. In the Lincoln fens geese are reared extensively.

Industries.—Among the nations E. stands unrivalled in the extent of her commerce and the variety and importance of her manufactures. The great cause of her pre-eminence is undoubtedly her singular combination of mineral and agricultural resources. Of all English industries cotton spinning and weaving is the most important, whether viewed from the standpoint of capital or of labour. There are upwards of 2000 mills, mostly in Lancashire, which use over one-half of all the raw cotton in the world, and employ, when on full work, some 600,000 hands. The adoption of powerful and ingenious machinery has enormously increased the production of all textile fabrics. The woollen manufacture, the oldest in the kingdom, and still of national importance, has its chief seat in Yorkshire, and centres in Leeds, Bradford, and Halifax. In London, Coventry, Nottingham, and Macclesfield, there are extensive silk manufactures. Bristol and Liverpool have great sugar-refineries and soap-boiling works, while equally notable are the distilleries and breweries of London, Burton-on-Trent, &c., the tanneries of Oxford and Worcester, and the perfume factories of Windsor. Paper is now

made in all parts of the country where good water can be obtained, and London is the great centre of the book trade.

E. supplies a great part of the world with metal goods, and has not fewer than 900 blast-furnaces, producing 5,000,000 tons of iron annually. The great coal-mines produce annually some 120,000,000 tons, valued at £42,000,000. The great iron and steel works are at Sheffield, Barnsley, Dowlais, Middlesbrough, and Barrow-in-Furness; Birmingham is the centre of the manufacture of iron and steel goods, chiefly pens, tools, and firearms; and Sheffield is the foremost place in the world for the production of cutlery. For copper and bronze working the foundries of Liverpool and Swansea are celebrated, as are those of London and Birmingham for bronze-casting. The specialties of Newcastle are steam-engines, iron ships, chains, iron bridges, glass, chemicals, &c. The Staffordshire 'Potteries,' including Stoke-upon-Trent, Burslem, Etruria, Hanley, &c., are noted for all kinds of china and earthenware. The great national industry of shipbuilding is carried on chiefly at Portsmouth, Plymouth, Sheerness, and Jarrow-on-Tyne, but mercantile and coasting vessels are constructed extensively at all the larger seaports. Coal is most extensively exported from Newcastle and Cardiff. Of the coast industries, the principal are the herring fisheries from the North Sea ports, the pilchard fishery in the English Channel, and oyster rearing in the estuary of the Thames.

For information regarding the commerce, railways, form of government, &c., and for general statistical details, see article GREAT BRITAIN.

History.—1. *Civil.*—The history of E. up to the transient union of the country under the Wessex dynasty is treated under ANGLO-SAXONS and BRITANNIA. During the second half of the 10th c. the old Teutonic constitution underwent considerable change: the king grew in dignity and power; the nobility of *ealdormen*, or nobility of birth, gave place to a nobility of *thegns*, officers at the royal court, whose rank sprang from their personal service to the king; the *folkland* was gradually becoming the king's private property; and feudalism was stealing into the land, colouring the early Teutonic customs and form of government. In the reign of Æthelred (979-1014) the great English monarchy which Dunstan had striven to build up fell to pieces. The old strife between Wessex and Mercia revived; the Danes renewed their invasions, and finally, aided by the English N. of the Thames, overthrew the Wessex dynasty, and founded a short-lived Danish monarchy in E. Cnut, by far the ablest of the Danish kings, sought to make E. part of a great Scandinavian empire, and did much to introduce a system of imperial feudalism, granting lands to vassal princes and earls, and strengthening the royal authority. Cnut's successors were coarse, savage sensualists, and E., wearied of their violence and incapacity, in 1042 recalled Eadward, son of Æthelred, from exile at the Norman court to his father's throne. Eadward was a foreigner in everything but his blood, and lavished his favour on Norman strangers, who now flocked into the country, while a truly national policy was upheld by the great Earl Godwine and his son Harold. The latter, on Eadward's death, was made king in 1066, but in the same year William of Normandy defeated him at Senlac, and ascended the throne, nominally as the rightful successor of Eadward, and the choice of the English people. The Norman conquest has been one of the most misunderstood events in English history. The invaders were simply Danes who had received a French varnish, men of the same blood as the inhabitants of Northumbria and the E. of Mercia, and no formal change was made in the old English constitution, William veiling his usurpation by advancing legal claims, which, though figments, made him scrupulously preserve the laws of King Eadward. The great results of the Conquest were—(1) That E. was welded into a compact nation, the separate kingdoms, which had flown asunder after every earlier attempt at union, being at last firmly cemented into a single state; (2) that the English were brought into closer contact with the Romance peoples, and won new culture and wider political relations; (3) that the growth of feudalism was in one respect checked—William developing the system of feudal tenure, but crushing the feudal principles which tended to curb the kingly power, and break up the nation; (4) that the old free institutions were, in name, strictly preserved, and rights, which might have gradually passed away under native English kings were thus enabled to revive in practice, having always existed in theory, a fact to which we owe the peculiar feature of our constitutional history—secure progress by giving new force to old privileges. The period 1087-1127 is marked by a distinct English revival. The people side with Rufus and Henry against the barons. The charter of the latter renounces the 'evil customs' which had been exacted from Church and noble, and his marriage with Matilda completed the conciliation of the English. The town communities were composed to a large extent of Norman traders and artisans, and English bishops began to appear in the Church. The government was carried on by the clerks of the royal chapel under the Chancellor and the Justiciar of the king's court, which, in place of the old council, registered laws, sat as highest court of appeal, and as court of exchequer assessed and collected from the sheriffs the royal revenue, consisting of rent from the royal domains, feudal aids, Danegeld or tax, and the fines of local courts. In the weak and stormy reign of Stephen of Blois, elected king by the folkmote of London, E. first tasted the oppression of the Norman feudalism. Henry II., the first of the Angevins (1154-89), came in under the influence of the priests Theobald and Becket. He had inherited Anjou and Touraine from his father, Maine and Normandy from his mother, and Poitou, Saintonge, Auvergne, Perigord, the Limousin, the Angoumois, and Guienne as his wife's dowry. The great quarrel as to royal rights of election and jurisdiction, &c., over the Church produced the murder of Becket. But the civil administrative policy of Henry was more successful. He commuted military service for scutage, revived Frankpledge (q. v.), and instituted trial by jury by the assize of Clarendon (under which trial by ordeal, till abolished by the Council of Lateran, took the place of compurgation, the English rival of the Norman trial by battle), made permanent the Eyre courts by the assize of Northampton, and by the inquest of sheriffs withdrew that important office from the great nobles of the shire. Great part of Ireland was added to the dominion of the Angevins. Under the Angevin kings the land was overrun by foreign adventurers and mercenaries, whom the crown maintained; the country was tyrannically misgoverned; and the people, formerly the allies of the early Norman kings against the barons, now banded with the nobles against the monarch. John lost Normandy, and engaged in a contest with the pope, by whom he was placed under interdict. The great event of his reign was the granting of Magna Charta (q. v.). In Henry III.'s time we find the pope and the king united against the English people and Church. The Great Charter and that of the Forest were systematically violated. To the patriotic genius of Simon Montfort, Earl of Leicester, E. owes the conception and realisation of a form of representative government for the purpose of administering the principles laid down in the charters. Supported by the *Communes*, he secured their separate representation by the Provisions of Oxford, annulled by the Mise of Amiens (January 1264); and although this plan was discontinued for a time, the principle was won, and thirty years later it became part of the settled practice of Parliament. The period 1265-84 is marked by the final conquest of Wales. This territory of the Britons had acknowledged the supremacy of Mercia and then of the West Saxon kings; but in spite of the victories of Harold, the frontier baronies founded by the Conqueror with 'licence to conquer,' and the half military settlements of Flemings and English under Henry I., the Welsh spirit of independence remained unbroken, and was strengthened by the revival of national poetry in the 12th c. and the long reigns of the two Llewelyns, the sons of Gruffyd ap Conan. During the Barons' war, Llewelyn ap Gruffyd, who had reconquered Glamorgan, was called 'Prince of Wales,' not merely 'Lord of Snowdon.' All this came to a sudden end in 1282. English barons were placed on the soil, which was divided into shires and hundreds, the castles of Conway and Caernarvon were built, trade-guilds were introduced to the towns, and the Statute of Wales abolished the more barbarous Welsh customs. In the years 1283-95, the growth or settlement of constitutional forms is rapid. It was the first Edward who restricted the courts Christian to spiritual, testamentary, and matrimonial causes, and laid the foundation of the justices' bench in the Conservators of the Peace. The Court of Chancery and the appeal to the king in council also practically date from his reign. The Statute of Winchester based a system of local police and criminal justice on the frankpledge; the Statute of Merchants provided for the recovery of commercial debts; and the statute *Quia Emptores*, while prohibiting subinfeudation, really tended to promote the transfer of land, and to free it from the rigour of feudalism.

Undoubtedly, however, the most important change related to the introduction into the Great Council or Parliament of (1) the knights of the shire, elected by the freeholders in the shire-mote or county court; and (2) the representative burgesses from the towns. Previous to this, the officers of exchequer had to make a separate negotiation with the town-reeves, the sheriff and shire-mote of each county, and the archdeacon of each diocese. The clergy were also summoned to Parliament, but they would vote nothing except in Convocation, and before Henry VII.'s time it had ceased to be the practice for them to attend. The Parliament itself, instead of meeting at Winchester, Acton, Burnell, Northampton, or Oxford, always met at Westminster. The old right of direct appeal to Parliament against injustice or oppression still lives in the election of Triers of Petitions by the House of Lords. The attempts made to govern Scotland, mediately according to the marriage treaty of Brigham, and immediately by an English council of regency, did not succeed, nor did the scheme adopted on the death of Wallace of giving Scotland ten representatives in the common Parliament. Above all, this is the period when the English boroughs completed their emancipation by obtaining the right of justice in the borough court, the right of self-government and self-taxation. Inside these boroughs the merchant-guild of land-owning traders had in many cases absorbed the earlier and minor frith-guilds, and had now the control of municipal affairs, of markets, fairs, tolls, coinage, recovery of debts. The differentiation of trades began: the cloth merchant was separated from the tailor, and the leather merchant from the butcher. Now also arose among the poorer inhabitants the craft-guilds, with their wardens and craft-boxes, enforcing uniformity of apprenticeship and work, first by voluntary custom, and then by royal charter. Especially in London there was a long and furious war between the aldermen, 'magnates,' or even 'barons' as they were called, the 'greater folk' or *prudhommes* of the merchant-guilds, and the unenfranchised craftsmen, who, first under William of the Longbeard and then under Thomas Fitz-Thomas, attempted to take the town-mote into their own hands. Under the livery companies of Edward III. there was a true popular *commune*. E. now did a trade with Norway and the Hanse towns, a wool trade with Flanders, a wine trade with Gascony. Italian vessels frequented the port of London, and Italian bankers settled in London. The completion of Salisbury Cathedral and Westminster Abbey indicates wealth. But neither the traders nor the tenant farmers, whom the enclosure of commons and system of leases were creating, took any part in government. The resistance to the king's power was left to the barons. It was, indeed, from their standing committee or continual council that the first Edward received his crown. Private wars among the barons, the excesses of the 'trail-bastons' or club-men, corruption of the judges, and legal and popular persecution and final expulsion of the Jews, mark this period. The important constitutional check on the nomination of the great officers of state, formerly called 'clerks of the king's chapel,' was asserted by the Lord Ordainers in their articles of reform (1310); and in 1321 the York Parliament made the famous declaration with regard to the consent of the prelates, earls, barons, and universality of the realm. In 1328, by the treaty of Northampton, the independence of Scotland was recognised. From 1337 to 1453 has been called the Hundred Years' War. While the woollen manufactures in the Flemish settlements on the E. coast and other trades flourished, the political and intellectual spirit of the nation was starved by the miserable war with France, which had no result but to fill that beautiful country with *Jacques Bonhommes*, or insurgent peasantry, and 'free companies' of disbanded soldiers. No doubt the Commons are now consolidated by the union of knights and burgesses, and the modern statute takes the place of the royal ordinance. But though the Good Parliament, headed by Peter de la Mare, asserted the right of free election (the writs having been tampered with by the king), and protested against arbitrary taxation, they could do little against the Church, which numbered 30,000 priests in a population of two millions, and owned a third of the soil, while their spiritualities amounted to twice the royal revenue. The Statutes of Præmunire and Provisors asserted the control of the civil power over the publication of papal bulls and the disposition of vacant benefices. But this did not stop the influx of Italian priests to E. The religious orders had become mere landowners, and the seculars, by selfish use of their wealth, had lost all spiritual influence. Wycliffe argued against the temporal power and privileges of his order, affirmed the right of free interpretation of the Bible, and denied the cardinal doctrines of Rome. The influence on the English mind of the short tracts which the Simple Priests or Lollards diffused among the people can hardly be exaggerated. They sowed the seeds of political principles which are still bearing fruit. In 1381 occurred the peasant revolt under John Ball and Wat Tyler. This event had been prepared by the changes in the condition of the serfs and bondsmen. Many of the villeins and cottars rose to be farmers, *i.e.*, they paid a fixed rent instead of the indefinite agricultural services previously exacted. Underneath this class of copyholders the bordars or labourers also lost their servile *status* and became free contractors for hire. The harsh statutes which were passed after the ravages of the Black Death to secure labour at customary wages, and especially the 'Fugitive' law, which confined men to a parish and made the harbouring of labourers in towns a crime, led to the great socialist outbreak, of which the immediate occasion was Richard's attempt to impose a poll-tax. The gospel of equality was preached by William Langland. The landowners, unable by unjust statutes to control the labour market, turned their attention more to sheep-farming, and by evicting the tenants of the small allotments, greatly reduced the number of the villein class and augmented that of the free labourers. The attempt of Richard II. to govern by a committee of twelve peers and six commoners was followed by the Lancastrian revolution, which brought on at home the Statute of Heretics, directed against Lollard preachers, schoolmasters, and believers generally, and abroad the conquest of France, Henry V. being recognised as the future king. The English national debt was now about £4,000,000. During the 15th c. charters of incorporation confined civic power, and especially the parliamentary franchise, to the select men of the common council, and the forty-shilling freeholder was introduced in the counties. The Club Parliament shows that supreme power rested with the great barons. By 1453 all the English possessions in France, except Calais, were lost. The rising of Jack Cade, whose Complaint of the Commons referred chiefly to free election and free labour, introduced the Wars of the Roses (1455–85), in which the House of York claimed the throne by descent from the fifth son of Edward III. The King-maker, the 'last of the barons,' Warwick, is the principal figure in the contest. These wars were practically decided by artillery, the great enemy of feudal war. Fortunately the towns took little part in the struggle, and trade did not suffer. But in the period of the new monarchy (1485–1509) Parliament is superseded by royal council; arbitrary taxation, imprisonment, and espionage become common. The baronage had been greatly thinned in number by the civil war; the Statute of Liveries broke up the military households, and it is supposed that nearly one-fifth of the land passed into the hands of the king by forfeiture. A religious movement, represented by More, Latimer, and Erasmus, protested against war, interested itself in the teaching at grammar-school and college, and recalled the Church to the simple faith in Christ, and the study of the newly-edited Bible at first hand. The rule of Wolsey (1515–31), as Chancellor and Papal Legate, based the Tudor despotism on the policy of peace, but at home the wholesale enclosures and evictions produced a great agrarian discontent, and Wolsey, who fell with Catherine of Aragon, was succeeded by Cromwell, who suggested to Henry the plan of declaring his supremacy in Church as well as State. Then followed what may be called the English Reformation. By the articles of religion the sacraments were reduced from seven to three—penance, baptism, and the Lord's supper. Justification by faith was strongly asserted, while purgatory, prayers for the dead, pilgrimages, pardons, and the mass were condemned. Transubstantiation and confession were retained. The dissolution of the monasteries was the prelude to the reign of terror, and the Pilgrimage of Grace was quenched in the blood of the Catholic nobles. The intimidation of Parliament and corruption of the courts of justice made possible the disgraceful excesses of the early Protestants against the Church; and these again caused the Catholic reaction expressed in the Six Articles, and the fall of Cromwell, whose favourite policy of a Christian league with the German princes against the Empire was never carried out. In Edward's reign (1547–53) the wheel turned again; the mass was denounced, the ornaments were snatched from the churches, priests were allowed to marry, and the liturgy and catechism superseded the missal and breviary, and wooden

tables the stone altars. Cranmer's forty-two articles of religion were rigorously enforced by a new set of Church laws. Amid the greatest confusion in the Church, and while the nobles were plundering the old guilds and chantries, the king founded eighteen grammar-schools. The evil times marked by the Spanish marriage of Mary (1554), the submission to Rome, and the martyrdom of Latimer, Ridley, Hooper, Cranmer, and the rest, were followed by the comparative quiet, peace, and conciliation of Elizabeth's reign (1559-1603). She founded in 1601 the English poor-law, which first distinguished between the impotent and destitute, and those broken men and sturdy beggars who were compelled to settle in a parish and work. The style of farming was greatly improved, and the spinning of yarn, and weaving, fulling, and dyeing of cloth became important. On the ruin of Antwerp (1585), London became the mart of the world, and Gresham founded the Royal Exchange; Chancellor opened the trade with Archangel, and Hawkins the slave-trade on the Guinea Coast. In domestic arrangements there was a great advance in comfort and cleanliness, even in luxury. The Elizabethan hall took the place of the baronial fortress. Members were summoned to the Commons from sixty-two new boroughs, and the exemption of members from arrest was obtained. Custom-duties were arbitrarily imposed, and money raised by privy seals, the forerunner of the Exchequer bills, but no benevolences were raised, and in 1601 the Act for the abolition of trade monopolies was passed. The persecution of the seminary priests was forgotten in the glow of patriotism called forth by the Spanish Armada (q. v.). As a whole, Elizabeth's reign was distinguished for bold naval enterprise and a marvellous burst of original literary power. The rise of the Puritans at the beginning of the 17th c. shows the hold which the English Bible was taking on all classes. The outrageous Calvinism of the Presbyterian Cartwright was opposed by the vague and optimistic philosophy of Hooker, and a succession of primates exercised spiritual despotism through the Ecclesiastical Commission. The pamphleteering vigour of the Separatists suggested that the license of printing should be strictly limited by law; and the 'Marprelate controversy,' and attempt of Cartwright to establish synods and classes in Northamptonshire, were suppressed. The absurd blunder of King James about absolute or divine right of kings was made matter of doctrine in the canons of the Church, and was extended to the bishops. The failure of the Hampton Court Conference lent greater spirit to the opposition in Parliament, which was mainly Puritan, and which, roused by the illegal imposition of subsidies, culminated in the Petition of Right. Eliot, Pym, and Hampden are the heroes of the parliamentary struggle, and the story of the Pilgrim Fathers is the best commentary on the High Church policy of Laud. The period 1629-40 witnessed the tragedy of the ship-money, to be followed by the civil war, in which Cromwell's Ironsides undoubtedly saved the liberties of E., not merely in battle, but afterwards by the position they occupied towards the Parliament. The succeeding years after the king's death really belong to the life of Cromwell, for he is at the head of everything. The Restoration of 1660 has been described as the beginning of modern E., in which industry, science, and love of popular freedom are the moving forces. The theology of the Reformation and the dread of Tudor and Stuart despotism had both lost their influence. The narrow and intolerable rules of Puritanism were broken, and while the wilder reaction towards immorality and irreligion may have been confined to London and the court, the great mass of the people 'gladly returned to Maypoles and mince-pies.' Perhaps, however, the most powerful influence of the time was the teaching of Bacon. The Oxford Society of Wallis, Wilkins, Petty, and Ward developed into the Royal Society (1662), and Harvey was succeeded by Halley, Hooke, Boyle, Sydenham, Woodward, Ray, Newton. Along with them appeared the Latitudinarian school of religious thought, which was founded by Lord Falkland, and contained Chillingworth, Taylor, Hales. The spirit of these men was first for toleration and then for reason, as against the infallibility of the Church and the rigid special interpretations of Scripture which the Puritans had made matters of life and death. They were succeeded by Burnet, Tillotson, and Butler. The theory of government was also profoundly affected by the daring scepticism of Hobbes, and by the moderation and sense of his disciple, Locke. In the Convention which Charles found sitting, there was in fact no dispute on any of the great constitutional struggles of the past. The royal revenue was now fixed at £1,200,000, and many oppressive feudal claims of the crown were extinguished by the conversion of land tenures from knight-service to socage. While Royalists were allowed to regain their confiscated private estates, the Convention protected those who had purchased Church lands. The first new Parliament was, however, entirely Royalist, and failed to carry out the promises of religious freedom made in the Declaration of Breda. The Test and Corporation Acts were passed against Puritan influence in the boroughs, and the Act of Uniformity drove 2000 rectors and vicars from the Church, with Howe and Baxter at their head, and thus created dissent, one of the great political as well as religious forces of modern E. This was followed by the Conventicle and the Five-Mile Acts. Episcopacy was restored in Scotland by the Drunken Parliament, and Cromwell's temporary union of the three kingdoms was broken up. The Declaration of Indulgence was only part of a scheme which Charles formed for establishing the Catholic religion. It was at once recalled, and Shaftesbury carefully fanned the rage of the 'Petitioners' for war against Catholic France, a feeling excited by the Popish plot. The 'Petitioners' and the 'Abhorrers,' who answered them, are the germs of the early Whigs and Tories, the great issue then being whether hereditary succession was to admit a Catholic to the throne. The Parliament of 1681 was called to Oxford, and Charles went there with troops; but the danger of civil war was averted by the flight of Monmouth and the death of Shaftesbury. And yet it was in this disgraceful reign, while the Triennial Parliament Act was constantly broken, that in 1679 censorship of the press was put an end to, and the grand principle of Habeas Corpus was reaffirmed. The period 1682-88 has been called the Second Stuart Tyranny. This was rendered possible by the forfeiture of a great many borough charters on the pretended ground that they had abused their privileges; and it was supported by such means as Jeffrey's Bloody Assize and a standing army of 30,000 men. The Church and the Universities were bullied, and the Nonconformists were bribed by a second Declaration of Indulgence, annulling all penal laws against both them and Catholics. The trial of the seven bishops and the organisation of Catholic power in Ireland by Tyrconnell brought matters to a crisis, and Danby, Compton, and Cavendish invited William of Orange to come to the rescue of the constitution. He landed in 1688, and James II. fled to France—this dethroning of the last Stuart king being known as the English Revolution. In the Convention which William summoned, a great deal of wrangling as to whether the crown had been forfeited, whether there should be a regency, whether Mary had succeeded, or whether the throne was vacant, ended in the recognition of William and Mary as joint sovereigns on the basis of the Declaration of Rights, which denied the right of the sovereign to exercise a dispensing power, or to exact money or maintain an army save by the assent of Parliament. Henceforth the right of the British sovereign to the throne becomes purely statutory (the Bill of Rights and the Act of Settlement). The rights of petition, free election, free debate, and pure justice in the courts were also asserted. Scotch affairs were settled by the Claim of Right, which restored Presbyterianism and the Confession of Faith, with the unwelcome addition of an Act of Toleration. Instead of life-grants, the vote of supplies was made annual. The Mutiny Act for the standing army, now become essential, was also made annual. Hence annual Parliaments are now a vital function of the state. The Act of Grace was a wise concession to the Nonjurors within the Church and the Jacobites outside. All this time the Grand Alliance had failed to curb the ambition of France, and on the advice of Sunderland the first homogeneous Ministry was formed by William out of the junto of Whigs who were favourable to war. Montague, Chancellor of the Exchequer, adopted Paterson's plan of a Bank of England, and courageously reformed the coinage. In the meantime the desperate resistance of Ireland had been overcome. When France threw overboard the Partition Treaties, E. necessarily entered on the War of the Spanish Succession (1702-13), in which the victories of Marlborough revived the memories of Creçy and Agincourt. In 1707 occurred the Union of E. and Scotland, delayed by the Scotch objections to the National Debt and Episcopacy, and the English love of colonial monopoly. The Scotch Parliament had indeed struck the name of Princess Sophia from the Act of Parliament. It is to the patriotism of Lord Somers that the chief credit must

be given for the defeat of the Nationalists and Federalists, and the securities given for Scotch law and the Scotch Church, along with a fair representation in Parliament and complete freedom of trade. In this, however, he only followed the more enlightened policy of Cromwell. From this point the history of E., along with that of Scotland, becomes the history of GREAT BRITAIN (q. v.).

2. *Ecclesiastical.*—Christianity, which entered Britain in the Roman period, but was for a time swept away by the Teutonic settlers, was reintroduced in 597, when Augustine, despatched as a missionary to the English by Pope Gregory, landed at Thanet and converted Æthelberht, King of Kent. The new faith spread over the land, and in the beginning of the 7th c. was diffused by Paulinus through Northumbria, which was also influenced by Christian missionaries from the Culdee monasteries in Scotland, offshoots from the Irish Church, then pursuing an isolated career independent of Rome. After a bitter struggle with heathenism in the Midlands, and with the Irish Church, which at one time seemed about to annex the North country, the English Church established its supremacy, and was organised by a Greek monk, Theodore of Tarsus. As in E. the early Christian Church of the Roman period had been quite eradicated, Theodore's organisation was determined by the existing political divisions of the country. He appointed bishops, whose sees corresponded with the kingdoms to whose rulers the first missionaries had attached themselves, settled the clergy in parishes, which were at first conterminous with the estates of the great nobles, made Canterbury the central see, and severed all alliance between the English and the Irish Church. E. was thus brought into contact with the civilising influence of Rome; learning and art entered the land; and the English clergy were freed from the lax discipline, confusion, and narrowing isolation of the Irish Church. The new Church grew rapidly in wealth and power, fostering literature and taking an active part in political events, Dunstan in particular being at one time both ecclesiastical and secular head of the kingdom, and doing much to increase the Church's influence in civil affairs. The Conquest broke this intimate association of the clerical with the secular power. William of Normandy supplanted English by foreign churchmen, who were cut off from their flocks and very largely dependent on the king. From William Rufus to Henry II. there were frequent disputes between the crown and the Church, in which the people always took the ecclesiastical side. In one respect the English Church differed from the Churches of continental Europe. In other countries the clergy were a separate *estate* in the government; in E. the greatest churchmen mingled with the nobles in the House of Lords. They were more bound up with the national interests, and were less of a class depending on the pope in E. than in the rest of Christendom. The contest between the king and the clergy soon shifted its aspects. In the dispute between Anselm and Rufus and Henry I., the churchman represented the claims of Rome; in the reign of Henry III., the king and the pope struggled together against the English Church and the English people. In the 14th c. the Church, which had sheltered freedom and learning, and done much to soften the evils of feudalism, sank into apathy and worldliness, and called forth the bold censure of John Wycliffe, 'the first Protestant.' He declared that the gospel is a perfect rule of life without clerical intervention, and combated the doctrines of papal supremacy, indulgences, pardons, absolutions, and worship of saints and images. He gained many disciples, nicknamed Lollards (q. v.), who, though cruelly persecuted, increased in numbers after Wycliffe's death. In the reign of Henry VIII. the ties between Rome and the English Church were broken. Thomas Cromwell's aim to reduce the Church to a department of the state was achieved for a time through Cranmer's suggestion that Henry should appeal to the Universities for the divorce from his queen, which the pope refused to grant. This expedient proving successful, a series of measures were passed which totally changed the character of the English Church. Henry was made Protector and Head of the Church, which became during the rest of his reign the tool of his despotism; the bishops were mere royal nominees, all connection with Rome was severed, first-fruits of the Church livings, formerly enjoyed by the pope, were confiscated to the throne, and the monasteries suppressed (1536). During Edward VI.'s reign the Reformation, now become a popular movement, advanced swiftly; the Common Prayer-book received its present form (1552), and men were commanded to subscribe to the forty-two articles of faith drawn up by Cranmer and Ridley, and afterwards under Elizabeth reduced to thirty-nine. At this time the English Church seemed tending to become Genevan, but on Edward's death Mary restored Catholicism, and subjected the Reformers to a terrible persecution. Her successor, Elizabeth, had to decide between the Church of Rome, the extreme Protestants, many of whom had been exiled to Geneva, and the moderate Protestants, led by Parker. Elizabeth enlisted with the last party, which wished to exclude papal authority from England, and to preserve as much of the old Church discipline and belief as was compatible with the removal of error and corruption. Thus was formed the present English Church, which still bears traces of the conflicting beliefs amid which it arose; its creed showing the influence of the Genevan party, and its liturgy and ritual recalling the older Church from which it sprung.

The English Church does not recognise the validity of orders unless conferred by a bishop, and she recognises the ordination of the Eastern and Western Catholic Churches. The English bishop, moreover, is entitled to refuse ordination. The present division of England into bishoprics (though many of the sees are old, and the two provinces also) rests on the Act 6 and 7 Will. IV. c. 77, which gave effect to the report of the Ecclesiastical Commission. (See BISHOP.) Every diocese is divided into archdeaconries, whereof there used to be sixty; every archdeaconry into deaneries, and deaneries into parishes. The Archbishop of Canterbury, formerly legate of the pope, is primate. London, Durham, and Winchester follow in precedence after the archbishops. For the inferior dignitaries of the Church, see PRIESTS, PARSONS, DEANS, and ORDINATION. Curates are either stipendiary, the temporary assistant of the rector or vicar, or perpetual, officiating in a parish or district to which the impropriator has nominated them. The latter institution arose from the transfer of benefices (in which there must always be a vicar) from spiritual societies to a single lay person, who of course could not serve the cure. There are a few peculiar preferments called donatives, because the patron can instal the donee without presentation to, or institution by, the bishop; *e.g.*, the church in the Tower of London is the king's donative. The stipendiary has to make a solemn declaration that a certain stipend has been agreed upon, and that no abatement is to be made for rent of the glebe, &c. The bishop may appoint curates where the incumbent is absent so many months in the year, or where the duties are ill performed; and he also fixes their salaries in cases of non-residence. The salary is never less than £80, unless the value of the benefice be less. The bishop has complete power over him by direct removal, and indirectly by revoking licence. The 'departing bell' and the alms given at funerals are probably founded on the old practice of 'masses satisfactory,' or prayers for the dead. Burial is still sometimes permitted in the church, but discouraged for sanitary and economical reasons. Every parishioner, even a suicide, is entitled to burial in the churchyard. The Cemetery Acts, and those constituting Burial Boards for parishes or several parishes, provide for a portion of the ground being unconsecrated for the use of Nonconformists. While the parson may not refuse burial, it must be accompanied by the Church service, and he is entitled to a fee, the origin of which was the oblation for prayers at religious houses. Of a similar kind are mortuaries, or corse presents, depending on custom. The Catholic form, 'Pray for the soul,' &c., is permitted. The liturgy and ritual of the Church strongly suggest her continuity with that before the Reformation. The Prayer-book contains the Breviary, the Missal, and the Ordinal. It is a translation of ancient Catholic liturgies. The rites, or services expressed in words, and ceremonies (gestures and acts which go along with words, including the use of lights, incense, and vestments) are not new.

An enormous revenue, under the name of 'tithes,' was drawn by the Church from every description of annual produce down to 1837, when the series of Tithe Commutation Acts brought in a corn-rent fixed in quantity though fluctuating in money value, and subsequently a rent-charge which ultimately frees the land. (See TITHES.) The name of offerings, oblations, obventions, applies chiefly to Easter dues (2d. per head, and in London 4d. a house), Pentecostal or Whitsun farthings, and the small sums paid at the other two great feasts (Christmas and Dedication). Fees proper are taken when the surplice is put on, or other act done by the priest for behoof of individuals. They arise on mar-

riage, burial, &c., but not on baptism; the old name is *altarage*. Large landed estates belong to the various sees and to the deans and chapters, and single prebendaries and minor cathedral corporations have also estates. Much of the property and of the administrations belongs to the Ecclesiastical Commissioners (q. v.). It is subject to Annates (q. v.), tenths, land-tax, and several public rates. In 1868 all compulsory church-rates were abolished, but voluntary rates may still be agreed upon.

For an account of the great assembly of the Church, see CONVOCATION. Besides her recent exclusive connection with the universities, the Church had a power of visiting the grammar-schools and licensing teachers. It was long debated whether a conscience clause could be permitted in these schools, and whether Dissenters might be appointed trustees. An Act in 1860 gave relief in the first of these matters, which was extended in 1868 to the seven public schools. The latter point was gained in the Endowed Schools Act of 1869, which also destroyed the episcopal power to license, and removed the necessity of masters being in holy orders. The Education Act of 1870 excludes the Church catechism from public schools. For an account of Church extension, see ECCLESIASTICAL COMMISSIONERS and QUEEN ANNE'S BOUNTY.

To enforce its law the Church has a system of courts of archdeacons, diocesan consistorial courts, and the courts of the primates or provincial courts.

See the Histories of Freeman, Stubbs, Froude, Macaulay, Green, &c.

Englan'té, or **Fruc'ted**, in heraldry, means fruited or fruit-bearing, and the expression is used of trees when tree and fruit are of different colours.

Eng'lish Bazar' (Angrazabad), the chief town of Maldah district, province of Bengal, British India, on the Mahanunda river, close to the ruins of Gaur, and 188 miles N. of Calcutta. E. consists of a series of trading villages lining the river bank. It has some silk-weaving industry, and the vicinity is very productive in the silkworm mulberry. Pop. (1872) 12,859.

English Chann'el (the *Oceanus Britannicus* of the Romans; Fr. *La Manche*, 'the sleeve'), the narrow sea separating the southern shores of England from the northern coast of France. It extends from the Atlantic to the North Sea, covering an area of 23,900 geographical sq. miles, and is 100 miles wide at the Chops, between Land's End and Ushant Isle. Reaching its greatest breadth of 140 miles between Portland Bill and St Malo, it narrows at Dover Strait to 21 miles. It contains the Scilly Isles, Channel Isles, Isle of Wight, &c. Strong westerly winds prevail, and a strong current runs in the direction of the North Sea. The depth of the Channel varies from 5 fathoms where there are sandbanks to 60, where the bottom is a coarse gravel. The Strait of Dover—12 to 30 fathoms—is paved with a chalk ridge, linking the two countries, and through this it is proposed to carry a submarine tunnel, the experimental works of which were begun at Sandgatte, near Calais, in 1876. The Channel is noted for its pilchard, mackerel, and oyster fisheries.—**E. Harbour** is the name of two fine havens, one on the S. coast of the British island of Antigua, the other on the Pacific shore of Costa Rica, in Central America. On the Antigua haven there is a trading-town of the same name. —**E. River**, the estuary of the Manhissa, enters Delagoa Bay to the N. of Zulu Land, on the E. coast of S. Africa.

English Debt. The foreign creditor should send written authority to his solicitor to sue. He should state the particulars of the debt, and whether he sues in his own right or as executor or trustee. He should transmit the ground of debt with relative affidavit, which in Scotland should be sworn before an authorised commissioner. See AFFIDAVIT.

English Drama. See DRAMA and ENGLISH LITERATURE.

English Language. The English speech was originally a pure Low German dialect of the Teutonic group of the Aryan or Indo-European family, its nearest cognates being the Old Frisian, Old Saxon, Dutch, and Flemish. It was brought from the Continent to Britain by various Teutonic tribes, who, beginning their settlements about the middle of the 5th c.,* gradually exterminated or drove westward the native Celts, and called the country Ængla-Land ('land of the Angles or English'). The history of the E. L. may be thus divided:—(1) Old or Early English, 450–1120 A.D.; (2) Middle English, 1120–1300; (3) New English, 1300 to present time.

I. *Early English.*—The language of the Teutonic settlers in Britain, to which the misleading name Anglo-Saxon has long been applied (see ANGLO-SAXONS), was, on its introduction into the island, fully inflected and almost free from foreign alloy. It was only slightly modified by the speech of the conquered Celts, few Celtic words appearing in English writers up to 1100 A.D. Such as were absorbed by it were mostly what the English would learn from Celtic slaves, *e.g.*, *basket*, *barrow*, *button*, *coat*, *funnel*, *gown*, *mattock*, &c. After the Christianisation of the English in the 7th c., various Latin words, chiefly ecclesiastical, were introduced by churchmen and English translators of Latin writers, *e.g.*, *saint*, *priest*, *candle*, *altar*, *church* (Greek), &c. This element is called Latin of the Second Period; while the earlier Latin infusion left by the Roman colonists, chiefly seen in names of places, such as *castra*, is styled Latin of the First Period. The Northmen or Danes, who began to invade England in the first half of the 9th c., and made a permanent settlement in the N.E. of the country in 878, helped largely to strip English of its inflections—a simplification incident on the mingling of peoples speaking different tongues—and introduced numerous Scandinavian words, such as *are*, *until*, *fro*, *ill*, *bark*, *bask*, *brave*, *dash*, *fly*, *ransack*, *earl*, &c. In the S., where the Danish element was almost entirely absent, the old inflections lingered much later than in the N., where the Norse influence is still visible in the names of places and in the provincial speech. Before the Norman conquest there were two great dialects of English—the Northern, which, after taking the lead as a literary medium, gave way, from a variety of political causes, to the Southern, or language of Wessex. These dialects arose from the original differences in the speech of the Teutonic settlers, the N. being colonised by Angles, and the S. mainly by Saxons. Old English was largely monosyllabic, pithy, picturesque, and copious, although somewhat rugged and wanting in melody and pliancy, qualities gradually gained after the Norman conquest of 1066, which at first threatened to destroy English as a literary language. It must not be supposed, however, that the Normans deliberately strove to root out the English speech, though such a notion is still vaguely entertained by many. There is not a shadow of evidence to show that they cherished any dislike to it whatever. Through the force of political circumstances it was lowered for a time from a literary, courtly, and official language to a popular dialect. At first English and Norman-French stood quite asunder. French was taught at school, and used in literature and law; no man who knew English only could advance in public life; and even rustics sought to speak in French, the language of the court, clergy, nobility, and authors. But the mass of the people clung to their old idiom, which, as is seen in the *English Chronicle*, underwent almost no change for about fifty years after the battle of Hastings.

II. *Middle English*, 1120–1300.—The influence of the Norman conquest, though great, is apt to be overrated. The disuse of English as the fashionable and literary tongue hastened the omission of inflections, the breaking up of the grammar, and the rise of great dialectic differences in the absence of an acknowledged literary standard. The loss of inflections and the simpler grammar which distinguish Chaucer's language from Ælfric's are not, however, solely due to the Conquest, for like changes have occurred in Low German tongues unaffected by events similar to the Norman invasion. The popular belief that modern English is the result of a mixture of Old English and Norman-French is utterly false. English is radically a Teutonic tongue, and the large French infusion in our present speech was mainly introduced since the end of the 13th c., after English had revived as a literary language. While Englishmen and Normans were two hostile classes, few French words crept into the E. L., nor was French chiefly used even for government documents until the 13th c., when it was the official tongue of half of Europe. In the 12th c. grammatical disruption went on more actively than the adoption of new words, but English, as it rearose, absorbed much of its Romance rival, and in the 13th c. many old Teutonic words were displaced by French equivalents. Middle English is mainly distinguished from Early English by the substitution of auxiliaries and prepositions for the old

* Skene in his *Celtic Scotland* (Edinb. 1876, vol. i. chap. 2–3) discusses this point, and argues with much cogency for an earlier date—the latter half of the 4th c.

inflections, the general contraction in spelling, the softening of certain consonants, the use of *to* before the infinitive, and the adoption of *s* as the plural ending, after a struggle with the *n* termination still seen in *men*, *oxen*, *children*, &c. The genitive is still in *es*, and there is still an accusative in *en*; but the inflectional endings tend to change into a silent *e*, which has been since shaken off from most words. The grammar is very confused and clearly transitional. The chief literary remains in Middle English are the last part of the *English Chronicle*, Layamon's *Brut*, the *Ancren Riwle*, and the *Ormulum*. In the two texts of the *Brut* (about 1200), which comprise 56,800 lines, there are not above 90 words borrowed from the Norman-French. In the *Ancren Riwle* (about 1220) there is the comparatively large proportion of 3 per cent. of French words. In these works English revived as a literary speech, while Norman-French was gradually sinking into a provincial dialect distinct from the language of Paris.

III. *New English*, 1300 *to the Present Time*.—In the 14th c. English had become the natural speech of the Normans, while French was acquired at school, almost as a foreign tongue, to equip men for literature and polite society. The wars with France helped to kindle a revolt against this undue preference of French as the speech of fashion and culture. In 1363 it was enacted that henceforth law pleadings should be carried on in English, as French was becoming unknown in the kingdom; and before the end of the century English was securely reinstalled as the language of the court and of such writers as did not express themselves in Latin. The English speech, which was thus restored to its old position, had, in the times following the Conquest, been broken up into many local varieties, but had only three strongly-marked dialects—the Northern, spoken in most of York, in Durham, Northumberland, and the Scottish Lowlands; the Midland, spoken in the centre and E. of England, from the Humber to the Thames; and the Southern, spoken in England S. of the Thames, and in Gloucester, Somerset, and part of Worcester and Hereford. These dialects are most easily distinguished by their various manners of inflecting the present plural indicative, in all forms of which the Southern employs *eth*, the Midland *en*, and the Northern *es*. The Midland was, moreover, divided into W. Midland, spoken in Cumberland, Westmoreland, Lancashire, Cheshire, Shropshire, &c.; and E. Midland, spoken in Lincolnshire, Norfolk, Suffolk, Cambridge, Northampton, &c. The latter variety, aided by its geographical position between the N. and S., became the dominant form. First made widely current by Robert of Brunne, who about 1303 composed the *Handlyng Synne*, it was used by Wycliffe and Gower, and was fixed as the classic dialect by the genius of Chaucer, since whose time the E. L. has changed comparatively little. In the 16th c. there were three dialects—the Northern, the Midland, which had spread over the S.E. counties, and the Western or old Southern. The once ruling speech of Wessex sank into a mere provincial variety, but the Northern dialect survived in Scotland, was there adorned by a series of great poets, and is now the purest relic of Early English, embalming many fine Teutonic words lost to the classic dialect of the south. The E. L. on its revival in the 14th c., while it had become by French influences more rich, flexible, and polished, was radically the speech of Ælfric. Chaucer's language is essentially Early English, with a new element of lightness, flowery delicacy, and dainty brilliance gained from the French, with Gallic fluency and grace wedded to Gothic vigour. But the effects of the Norman conquest on the E. L. were not solely beneficial. One evil result was the loss of many Teutonic words which were driven out by weaker French synonyms. The old English poetic diction especially suffered, about a third of it being held to have vanished before 1200. The Romance infusion also checked the free expansion of the Teutonic element, the language losing its power of making fresh compounds from Teutonic roots, as writers preferred to borrow new words from the Latin and French. Besides swelling the vocabulary, the French exerted a certain formative influence over our speech, as, for example, by adding the Romance ending *age* to the English *bond* in *bondage*, by changing the English *u* into *ou*, by substituting *qu* for the early *cu* in such words as *quick*, *qualm*, *queen*, *quoth*, &c. On the other hand, many French words received an English form in which their Romance origin can scarcely be detected, while another effect of the long predominance and large influx of French was to give a modulation to the speech quite distinct from the old English accent and rhythm. From the subtle interaction of English and French during the rise of the present form of our language, it is often difficult to say whether a word is of Teutonic or Romance origin; and, moreover, several apparently Latin derivatives brought in by the Normans were Celtic or more often Teutonic roots, while Norman-French, though essentially a Romance tongue, was at the time of the Conquest thickly sprinkled with Scandinavian words.

In the 15th c. the East Midland continued to spread; inflections still further fell away; Romance prefixes and affixes were welded to Teutonic words, and *vice versa*; the language became more uniform as the Romance element was slowly fused with the Germanic. The introduction of printing by Caxton (about 1470) aided greatly to fix the grammatical structure of English. During the 16th c., when the Renaissance spread into England, and enthusiasm for the classics was at its height, Greek and especially Latin words, many of which have since been forgotten, poured into our vocabulary. Even in the Elizabethan period the E. L. was in a partly transitional state. The national speech had then to express a vast wealth of new thoughts, feelings, and discoveries, and fresh words were needed, especially to convey abstract ideas. Many words were culled from the Latin which are now obsolete, as *stelled*, 'starred,' *aidant*, *disnoble*, *rubious*, *renege*, 'to deny,' *ruinate*, *continuate*, *rondure*, 'a circle,' *accite*, 'to summon,' *charactery*, 'what is written,' *antres*, *ingen*, 'ingenious,' *copy*, 'plenty,' &c. Latin and Greek words which have since been limited in meaning are used in a general sense, as *aggravate*, 'to add to,' *journall*, 'daily,' *exorbitant*, 'uncommon,' *travail*, 'work,' *extravagant*, 'wandering,' *conceited*, 'fanciful,' &c. Other Latin and Greek words occur in a narrower sense than now, as *abridgment*, 'a dramatic performance,' *influence*, 'the influence of the stars,' *ovation*, *triumph*, *decimate*, &c. Also numerous English verbs are employed in many various senses, as *take* for to consider, to understand, to bewitch, to interrupt, to resort to, &c., *pass* for to surpass, to pass sentence, to assure, to care for, &c. There is a strong and sometimes excessive fondness for compound words and phrases, as *marble-constant*, *furnace-burning*, *back-return*, *wind-changing*, *honey-heavy-dew*, &c. This tendency to strike out new words is often at variance with the nature of the language, as when a Latin ending is fastened to a Teutonic root, or *vice versa*, *e.g.*, *bodement*, *increaseful*. The Renaissance led the Elizabethan prose-writers to imitate Latin authors, to frame long rounded periods, somewhat tangled and cumbrous, but showing a grandeur of phrase and rhythm novel in our literature; while the Elizabethan poets lent their style the charm of racy facile vigour by free recourse to the popular idiom, and played wild freaks with grammar, bending syntax to their whim, using adverbs as verbs, verbs as nouns, and nouns as adjectives—a daring laxity partly due to their wayward fancifulness, partly to the transitional state of the language. Their strange constructions are often experiments prompted by the loss of the old inflections, or are caused by the secret suasion of the old syntax. Compared to our present English, the Elizabethan is superior in freedom and terse strength, but inferior in clearness and correctness. Gradually syntax became more strictly observed, and as the Renaissance enthusiasm cooled, Latin and Greek words were less wantonly pressed into service. The authorised version of the Bible (1611) has done much to preserve many exquisite old English words, and has been an abiding influence for good on English style. In the 18th c. the Teutonic element was sacrificed to the Latin, the result being a style generally heavy and pompous, but sometimes, as in Gibbon, full of a splendour that would be august if it were not artificial. In the present century, a healthy reaction has set in for Teutonism, which may, however, be likewise carried to excess. See Oliphant's *Standard English* (Macmillan, 1873); Morris's *English Accidence* (Macmillan, 1873); Earle's *Philology of the English Tongue* (Clarendon Press, 1871); Morris and Skeat's *Specimens of Early English* (Clarendon Press, 1872); Skeat's *Specimens of English Literature* (Clarendon Press, 1871); Abbott's *Shakespearian Grammar* (Macmillan, 1872); and the works of Marsh, Latham, &c.

English Literature. 450-1066.—The earliest E. L. in the vernacular consisted of songs of war and adventure, such as *Beowulf* (q. v.), paraphrases of Scripture, &c., which are treated of under ANGLO-SAXON LITERATURE. Alongside of these war-songs, hymns, and translations, there grew up a literature

written in Latin by Englishmen and Welshmen, of which the chief specimens before the Norman conquest are the *Historia Britonum*, ascribed to Nennius (q. v.), the *Epistola de Excidio Britanniæ* of Gildas (q. v.), the *Annales Rerum Gestarum Ælfredi Magni*, commonly ascribed to Asser (q. v.) (but both the authenticity and genuineness of this work are now strongly challenged), the *Historia Ecclesiastica Gentis Anglorum* of Bede (q. v.), and the *Colloquy* and *Glossary* of Ælfric (q. v.). This learned literature was born in Northumbria and Strathclyde; but, on Wessex winning supremacy, flourished most abundantly in the S., where scholarship was especially fostered by Ælfred. At the Norman conquest literature in English was for a time crushed; while works in Latin continued to be written, and a foreign literature in French, produced mainly by Norman *trouvères*, arose. The 11th c. has few names of note. Among its leading authors are Osbern of Canterbury, who wrote a history from the creation to 1083, and Turgot, who composed a chronicle of Durham monastery. The 12th c. is prolific in names, but none are of high rank. The Conquest, besides for a time stifling English verse and prose, and introducing a French literature quite alien in style and theme from the first writings in English, permanently affected E. L. Rhyme, which certainly occurs in the old English hymns and sagas, and which may have stolen into English verse from Wales, was first popularised by the Normans, and drove out the ancient system of alliteration; while, instead of the old heroic poetry which sang of the deeds of Englishmen on the Continent and in England, long romances were woven celebrating the exploits of mythical and semi-mythical heroes. When the vernacular literature revived, the old national themes were forgotten, and Englishmen adopted subjects which the Normans had rendered familiar. The early heroic lays were thus hushed for ever, but the early devotional poetry was prolonged, though in humble form, until in the 13th c. we see in Ormin (q. v.) a genuine successor to Cædmon. The French literature, thus for a time dominant in England, was narrative rather than lyrical, being transplanted from the N. of France, the region of the *Chansons de Geste*. Compared to the English literature which it displaced, it was wanting in earnestness, fire, and energy, was more gay and shallow, with a novel finesse and quaint floweriness of style. This French nicety of diction ultimately blended with and toned down the rude strength of the early Teutonic verse, and imbued English poetry with a lightness and grace which it could not have developed from its original resources alone. Prose annals were plentiful during the 12th c., the chief chroniclers being Florence of Worcester (q. v.), Eadmer (q. v.), Orderic (q. v.), Henry of Huntingdon (q. v.), and William of Malmesbury (q. v.). In the last a new historic spirit begins to dawn, shown by a tendency to weigh facts and look into the state of the rest of Europe; and healthy patriotism and independence glance out from Eadmer, Henry of Huntingdon, and the *Legend of Hereward*. In this century the *English Chronicle* ends with a dark graphic picture of the woes of King Stephen's reign, and the cycle of Arthurian romance is firmly ingrafted on our literature by the fabulous Latin history of Geoffrey of Monmouth (q. v.), which first popularised the stories of Arthur and the Round Table, so often retold by our poets. Through the influence of Geoffrey's work, E. L. adopted a body of Arthurian and pre-Roman legends, which, despite its mediæval and fanciful colour, perhaps keeps some strangely-altered fragments of the history of W. Wales, mingled with wild stories created by Welsh and Armorican bards, and which unfortunately came to be viewed as sober truth, and blinded men to the real acts of the Teutonic settlers in Britain. In the 12th c. Alfred of Beverley recounted the Arthurian tales in the form of a genuine chronicle, and the *trouvères* Gaimar (q. v.) and Wace (q. v.) recast them in French verse. Towards the end of the century literature becomes secularised, a keen inquisitive faculty appears, and a political rather than a monkish spirit breathes through history. Satire and criticism spring up in the gifted Walter Map (q. v.), in Nigel Wireker, whose *Brunellus* assails the monkish orders, and in Gerald de Barri, or Giraldus Cambrensis (q. v.), the earliest English political pamphleteer. Ranulf de Glanvil (q. v.) writes the first work on English law, John of Salisbury gathers up the learning of the time in his *Polycraticus*, literary criticism is begun by Geoffrey de Vinsauf, and history is compiled by William of Newbury and Roger of Hoveden (q. v.), who carry us into the 13th c. Meanwhile the vernacular literature maintained a lowly existence in the shape of homilies, translations, and other religious works, and in treatises on the knowledge of the times. The 13th c. is an age of fresh intellectual activity, of ardent zeal for learning—a fleeting and premature foreshadowing of the Renaissance. New ideas and a more liberal culture were diffused by the Moors of Spain and by the influence of the Crusades; the splendours of Oriental fiction were wafted from the far East, and the rudiments of science stole in from the schools of Cordova and Granada. The English universities began to affect literature, and Latin was zealously studied. Adelard of Bath introduced the elements of science from Spain; Roger Bacon reflected the rebellious spirit of inquiry which was abroad, and sought to embody the encyclopædic idea of knowledge which was then arising; Robert Grossetete (q. v.) was the foe of the Pope, and forerunner of Wycliffe; and William Occam (q. v.) was the trenchant assailant of scholastic Realism. History became filled with a patriotic spirit in Roger of Wendover (q. v.) and Matthew Paris (q. v.), who is the best of the monkish chroniclers. Long French romances of Arthur and Charlemagne, of Havelok and King Horn were abundantly produced, often based on Scaldic or Saracenic tales, and tedious from their fluent minuteness. But the great feature of the century was the revival of English as a literary tongue in the *Brut* of Layamon (q. v.); the English history of Robert of Gloucester (q. v.), where the patriotic English spirit shines out brightly; in the *Ormulum* of Ormin or Orm (q. v.); and in the *Handlyng Sinne* of Robert of Brunne, written about 1300. These works are mostly of linguistic rather than of purely literary value, the finest poetry of the time blossoming forth in the short English lyrics and ballads, sweet and simple verses, lit with a quaint, tender passion, tinged with a charming love of nature, and blending the old Teutonic strength with French grace and refinement. Such a union of qualities is seen in the *Owl and the Nightingale*, a true English *fabliau* written in the reign of Henry III. New rhythmical forms are introduced, and octosyllabic verse becomes a favourite medium for narrative. Many of the ballads cluster round the favourite hero Robin Hood, and similar outlaws. The 14th c. is a time of great political and religious movement, the age of Lollardism and the peasant wars. The inquiring spirit which awoke in Walter Map becomes bolder and more democratic, and English completely overthrows French as the literary speech of the land. Lyrical poetry still blooms, pleasantries like the French *fabliaux* are numerous, and the brooding earnestness of the pre-Norman literature reappears in severe homilies, such as Richard Rolle's *Pricke of Conscience* (about 1340), and Dan Michael of Northgate's *Ayenbite of Inwyt* (about 1350). Laurence Minot's war-songs (about 1350) echo the national pride in the victories of Edward III. The chief writers of the century are William Langland (q. v.), John Wycliffe (q. v.), John Gower (q. v.), Sir John Mandeville (q. v.), and Geoffrey Chaucer (q. v.). Langland, in the satire *Piers the Plowman*, gives voice to the misery of the people, and mirrors the dark side of the age, while its brilliant aspect is reflected in Chaucer. Two streams of poetry unite in Langland's work—the satiric, which began in the 12th c., and the religious, which began with Cædmon. Wycliffe translates Scripture into racy, homely English, and spreads the Lollard reform. Gower writes huge allegorical poems full of learning. Mandeville is, next to Sæwulf, our earliest great traveller, and, along with Wycliffe and Chaucer, may be called the father of modern English prose. Chaucer is our first great poet, and his works are the crowning flower of the playful, satiric, and amorous mediæval poetry which takes a frank interest in human character and daily life, as distinguished from the mystic mediæval poetry, of which the loftiest representative is Dante.

1400–1580.—After the death of Chaucer, the struggle with France, the Lollard controversy, the Wars of the Roses (1430–1485), and the Anglican Reformation, caused a literary decadence during the 15th and the earlier years of the 16th c. Men were alienated from verse to polemics, and the best poetry of the 15th c. is found in the simple, forcible ballads of the North and Midlands. Most of the Robin Hood ballads, the *Nut-Brown Maid*, and a version of *Chevy Chase*, belong to this period. The chief writers in verse of the 15th c. whose names we know are Occleve, Lydgate, and Hawes, who produced long, cold, and gaudy allegories. In the beginning of the 16th c. popular poetry revived in the boisterous Skelton (q. v.), and the dawn of the English Renaissance is visible in the works of Surrey (q. v.) and Wyatt

(q. v.). They were imitative rather than original, but through their adoption of classic and Italian metres, such as the sonnet and the blank verse introduced by Trissino, and the sparkling, limpid fluency of their style, they helped largely to adorn and chasten the language, and bring in a more refined and ornate school of poetry. They are sometimes regarded as the fathers of 'subjective' poetry in England. As the century advances, the growing influence of the Renaissance and the rise of a new poetry are seen in such works as Tottell's *Miscellany* (1557) and Edwards' *Paradise of Dainty Devices*, collections of moral pieces and love-songs in the *Mirrour for Magistrates* (see SACKVILLE), and in the varied writings of Gascoigne. Comedy dawns in Udall's *Ralph Royster Doyster*, tragedy in Sackville's *Gorboduc*, and the historical play or history in Bale's *King John*. (For the rise of the English drama see MIRACLE PLAYS and DRAMA.) The increasing love of literature and interest in foreign works are shown by the number of translations, especially from the Italian, such as Painter's *Palace of Pleasure* (1563); and popular fiction underwent a change, the place of the Arthurian and other long chivalrous romances being taken, to a great extent, by tales from the Italian and new stories of English life. Among the English prose romances, 'the Waverley Novels of the 16th c.' are *The Six Worthy Yeomen of the West*, *Tom-a-Lincoln*, *George-a-Green*, *Robin Hood*, *The Seven Champions of Christendom*, &c. The chief prose writers of the period are, in history, Caxton (q. v.), Fabyan (q. v.), Lord Berners, Cavendish, Bale (q. v.), Hall (q. v.), Leland (q. v.), Foxe (q. v.), Hollinshed (q. v.), Linacre (q. v.); in polemics, Pecock, Fisher, Tyndale (q. v.), Elyot, Coverdale (q. v.), Cranmer (q. v.), Latimer (q. v.), Ridley (q. v.), Gardiner (q. v.), Pole (q. v.), Foxe, and Jewell (q. v.). The *Paston Letters*, the correspondence of the Paston family from 1420 to 1505, give valuable social details. Perhaps the finest prose of this period is Sir Thomas Mallory's (see MALLORY) *Morte d'Arthur* (1485), but in the 16th c. we see clearly, in More and Ascham, the dawn of a new prose style. In 1470 Caxton introduced printing, but the art did not give a powerful impulse to literature until the Elizabethan era. This period was rife with change, the systems of chivalry and feudalism vanished, the Church was revolutionised, thought was freed from scholasticism, and the new learning flowed into the country, where it was diffused by writers and scholars such as Cheke (q. v.), Colet (q. v.), Grocyn (q. v.), Linacre, Warren, Ascham (q. v.), and More (q. v.). (For the English translations of the Bible belonging to the period see BIBLE.)

1580–1625.—This period, known as the Elizabethan, is the golden age of E. L., rich in poetry and prose, in imaginative and speculative writings. It is peculiarly the palmy epoch of the English drama. Its greatness was especially due to the Renaissance powerfully stirring the English mind at a time of splendid national progress, of victory and discovery, of patriotic and religious awakening. Instead of meeting with an emasculate society, and flowering into sculpture and painting as in Italy, the Renaissance in England found a people in unprecedented national vigour, and was centred wholly upon literature. The invention of printing was now bearing fruit, maritime discovery kindled the poetic imagination, and England's attitude as the defender of Protestantism heightened patriotic enthusiasm. The new literature is broadly distinguished by its keen interest in human action and passion and by the extent to which it is affected by Italian writers. This Italian influence takes two forms—on the one hand flushing the Elizabethan narrative and love-poetry with a Southern affluence of lovely colour, and instilling a fondness for soft melodious verse, while on the other it leads the dramatists to choose their themes from the blackest episodes in Italian tales and annals. The principal dramatists were Peele (q. v.), Greene (q. v.), Marlowe (q. v.), Lodge, Kyd, Munday, Chettle, Nash, and, immediately succeeding these, Shakespeare (q. v.), Jonson (q. v.), Beaumont (q. v.), Fletcher (q. v.), Dekker (q. v.), Webster (q. v.), Ford (q. v.), Chapman (q. v.), and Massinger (q. v.). The Elizabethan drama is unrivalled for grandeur, comprehensiveness, and variety, revealing the keenest insight and the most lavish fancifulness, the most aerial sublimities and the most grotesque incidents, grappling with the deepest problems of life, and revelling in the wildest sallies of wit. (See DRAMA.) Of non-dramatic poets the greatest is Spenser (q. v.), whose glowing colour, sweetness of verse, and taste for allegory were imitated by Sidney (q. v.), Harrington (q. v.), Daniel (q. v.), Drayton (q. v.), Sylvester (q. v.), Chapman, Giles and Phineas Fletcher (q. v.), and William Browne (q. v.). Long narrative poems, dealing with English legend, history, and scenery, were written by Daniel, Drayton, and Warner; metrical satire by Donne (q. v.) and Hall (q. v.); and lyric poetry was exquisitely developed by the dramatists. Pastorals, imitative of Italian poetry, were written by Spenser, Fletcher, Drayton, Jonson, Browne, &c.; sonnets and love-songs abounded. Throughout this poetry there runs a love for fantastic conceits and strained refinements, which, arising from Euphuism (q. v.), a natural growth of the Renaissance popularised by Lyly (q. v.), and chiming with the courtly taste, disfigures the writings even of the greatest dramatists, and becomes the chief feature of English poetry in the first half of the 17th c.

The chief Elizabethan prose-writers are, in history and scholarship, Foxe, Stowe (q. v.), Speed (q. v.), Camden (q. v.), Raleigh (q. v.), Spenser, Hooker (q. v.), Bacon (q. v.), Burton (q. v.), Usher (q. v.), and Selden (q. v.); in science, Bacon, Napier (q. v.), Harvey (q. v.), and Lord Herbert of Cherbury (q. v.); in controversy, Whitgift, Cartwright, Robert Brown, Nash, Donne, and Hall; in fiction, Greene, Lyly, Sidney, and Bacon. The prose is for the most part stately and periodic, as in Hooker, but is also, in the euphuistic writings of Lyly, Greene, and others, antithetic and full of conceits.

1625–1688.—From 1625 to 1640 E. L. held its Elizabethan characteristics; Jonson, Marston, Massinger, Ford, Shirley (q. v.) were active as dramatists; and, though the Puritanic hatred of the theatre was strengthening, as shown by Prynne's *Satiromastix* (1632), plays, and especially fantastic pieces called *masks*, were highly popular. The pastoral and allegorical poetry, founded by Spenser, was continued by William Browne, and Giles and Phineas Fletcher; and the early poems of Milton, which belong to this time, breathe the Spenserian spirit. The taste for intellectual subtleties and far-fetched analogies, which the Elizabethans borrowed from Italy, became more conspicuous in the verse of Habington, Henry More (q. v.), Crashaw (q. v.), and Cowley (q. v.), who was now beginning his poetic career; vigorous metrical satires were composed by Jonson, Hall, Davenant (q. v.), Wither (q. v.), and Cleveland; charming love-songs, anacreontics, and epigrams, full of sportive grace and tripping music, were written by Jonson, Wither, Carew (q. v.), and Herrick (q. v.); and prose, for the most part retaining the Elizabethan intricacy of style and wealth of classic allusions, was represented by Donne, Usher, Jonson, Selden, Burton, Herbert of Cherbury, Wither, and Chillingworth (q. v.). From 1640 to 1660 literature, excepting polemics, was almost silenced by the civil wars and subsequent Puritan rule. The closing of the theatres by the Puritans in 1642 put an end, for a time, to playwriting, and the higher prose was almost stifled by a vast outcome of pamphlets for and against the king—Presbyterian and Independent, Cromwellian and anti-Cromwellian — Milton plunging into the controversy, and vindicating the Roundheads in gorgeous polemical treatises. The chief prose writers were —in philosophy, Hobbes (q. v.) and Sir T. Browne (q. v.); in theology, Jeremy Taylor (q. v.); in history, Clarendon (q. v.) and Fuller (q. v.); in polemics, Milton (q. v.), Laud (q. v.), Hall, Prynne (q. v.), Fuller, and Whitlocke. Excepting parts of the works of Davis, Marvell (q. v.), Denham (q. v.), Davenant, and Wither, verse was confined to Cavalier songs and lampoons on Royalists and Roundheads, the ablest of such song-writers and satirists being the Royalist Cleveland. The Restoration, in 1660, suppressed controversial writings, restored the drama, and introduced a new literature, deeply marked by French influences, by profligacy, scoffing wit, and a strong anti-Puritan bias. Only a few writers held aloof from the general tendencies, notably Milton, who now returned to poetry and wrote his great epics; Butler (q. v.), who flouted Puritanism in the style of the conceit-writers; and Cowley, who continued to weave subtle frigidities into serious verse. Mainly through the influence of Dryden (q. v.), a new poetry arose, modelled on the French critical school, which, under Boileau's guidance, had crushed euphuism in France; English verse, stripped of conceits, became more direct, simple, and mechanical; and brilliant didactic energy took the place of idealism and imaginative fervour. Rhyming tragedy was imported from France, and Dryden sought vainly to found a new drama uniting Elizabethan fire with French symmetry of form. The chief writers of tragedy were Dryden, Lee (q. v.), Crowne, and Otway (q. v.). Romantic plays had vanished; but comedies of city life, foully indecent, but glittering with wit, were

written by Congreve (q. v.), Wycherley (q. v.), and Vanbrugh (q. v.), a purer drama at last arising with Farquhar (q. v.). Verses of society, sometimes with a pleasant *naiveté* in their florid badinage, were composed by such noblemen as Dorset (q. v.), Sedley (q. v.), and Rochester (q. v.).

The influence of French literature on the prose of the period produced a more correct and elegant syntax, the chief prose writers being, in philosophy, theology, and polemics, Hobbes (q. v.), Browne (q. v.), Taylor (q. v.), Cudworth (q. v.), Barrow (q. v.), Tillotson (q. v.), Sherlock (q. v.), South (q. v.), Leighton (q. v.), Pearson (q. v.); in scholarship and history, Clarendon (q. v.), Aubrey, Evelyn (q. v.), Pepys (q. v.), Dugdale (q. v.), Rushworth; in fiction, esssays, criticism, &c., Dryden, Cowley, Walton (q. v.), and John Bunyan (q. v.).

1688–1788.—This period, from the English Revolution to the French Revolution, may be called the period of the 18th c. It is markedly an age of great prose authors, none of our very best poets, but many of our foremost prose writers, belonging to it. In the early part of the century satires and pamphlets were abundant, and during Queen Anne's reign literature became mainly a party tool, the chief writers enlisting with Whigs or Tories, and receiving preferment for their services. The principal poets of the first half of the century were Arbuthnot (q. v.), Gay (q. v.), Swift (q. v.), Pope (q. v.), Phillipps, Prior (q. v.), Young (q. v.), Warton (q. v.), and Thomson (q. v.). The poetry of this era, known as the English 'Augustan' age, is distinguished by fastidious metrical art, displays the perfection of polished verse, but wearies by the sameness of its cadences, and the absence of true passion and spontaneous grace. It was largely didactic, was mainly devoted to satire and pictures of town life, having lost the aroma of the country, and was cast almost wholly in the heroic couplet, which in the hands of Pope, the master-poet of the time, constantly sparkles into jewels of epigram. The chief prose writers in the beginning of the period were Bolingbroke (q. v.), Locke (q. v.), Swift, Berkeley (q. v.), Butler (q. v.), Addison (q. v.), Steele ((q. v.), and Defoe (q. v.), the writings of the last three clearly marking the decline of patronage and the revival of popular influence. In place of the many-linked, sonorous prose of the 17th c., a lighter, simpler style was adopted; Defoe and Swift writing with racy vigour, Addison and Steele with careless, idiomatic grace. Comedy died out before realistic prose fiction, which was admirably developed by Defoe, Swift, Richardson (q. v.), Fielding (q. v.), and Smollett (q. v.); and afterwards received a more graceful and idyllic, though less robust, treatment from Sterne (q. v.) and Goldsmith (q. v.). To the second half of the century belong several of our noblest monuments of history. Prose became heavily Latinised, more precise and ornate, and more stately in rhythm than Addison's or Steele's in the works of Johnson (q. v.) and Burke (q. v.), and of the historians Gibbon (q. v.), Robertson (q. v.), and Hume (q. v.); while Goldsmith united the polish and accuracy of the Johnsonese with the graceful abandonment and lighter structure of the Addisonian style. The chief writers in philosophy were Hume, Paley (q. v.), and Adam Smith (q. v.). The foremost poets were Gray (q. v.), Goldsmith, Shenstone (q. v.), and Collins (q. v.), who partly clung to the 'Augustan' manner, partly broke away from it in lyrics and idylls, which, despite their artificiality, show true fervour and delicate pensiveness; Blake (q. v.), a strange mystical genius; and, above all, Cowper (q. v.) and Burns (q. v.), in whom natural and impassioned poetry revived. During the latter part of the century authors lean again upon the public, patronage decays, periodical criticism arises, and the newspapers gain vastly in power and usurp the functions of the political pamphlets.

1788–1876.—This period is second only to the Elizabethan for the number and splendour of its names. The chief poets of its earlier years were Byron (q. v.), Shelley (q. v.), Keats (q. v.), Coleridge (q. v.), Landor (q. v.), Wordsworth (q. v.), Scott (q. v.), Moore (q. v.), Crabbe (q. v.), Campbell (q. v.), Rogers (q. v.), Southey (q. v.), Wells (q. v.), and Leigh Hunt (q. v.). Many of these writers, deeply moved by the French Revolution, filled their verse with stormy passion, fiery rebellious protests, and a kind of nature-worship partly borrowed from Rousseau; while others led a strong reaction against the poetic style of the Queen Anne writers. Romantic poetry revived, new metres were adopted, Gothic and Eastern tales displaced the old 'classical' themes, lofty philosophic musings were cast into verse, and nature was described with novel subtlety of insight and freshness, novel energy, and felicity of language. The chief prose writers in fiction, philosophy, and criticism were Scott, Coleridge, Southey, Bentham (q. v.), Mill (q. v.), Godwin (q. v.), Stewart (q. v.), Galt (q. v.), Miss Austen (q. v.), Jeffrey (q. v.), Wilson (q. v.), Hazlitt (q. v.), Lamb (q. v.), Leigh Hunt, Landor, De Quincey (q. v.), &c. Gradually the revolutionary glow faded from poetry, and at length a new school was founded by Tennyson (q. v.). The greatest Victorian poets are Tennyson, R. Browning (q. v.), Mrs Browning (q. v.), Hood (q. v.), Arnold (q. v.), Taylor (q. v.), Dobell (q. v.), 'G. Eliot' (q. v.), W. B. Scott, D. Rossetti (q. v.), C. Rossetti (q. v.), Morris (q. v.), and Swinburne (q. v.). There seem at present to be signs of the dawn of a new lyric and dramatic school. Of prose writers, recent or living, the chief are, in history, Hallam (q. v.), Alison (q. v.), Macaulay (q. v.), Carlyle (q. v.), Grote (q. v.), Thirlwall (q. v.), Merivale (q. v.), Milman (q. v.), Buckle (q. v.), Finlay (q. v.), Stanley (q. v.), Helps (q. v.), Kinglake (q. v.), Burton (q. v.), Froude (q. v.), Stubbs (q. v.), and Freeman (q. v.); in biography, Forster (q. v.), Lewes (q. v.), Masson (q. v.); in philosophy, Hamilton (q. v.), Carlyle, J. S. Mill (q. v.), Newman (q. v.), Maurice (q. v.), Bain (q. v.), and Herbert Spencer (q. v.); in criticism, De Quincey, Ruskin (q. v.), Arnold, Carlyle, J. Morley, Swinburne; in fiction, Lytton (q. v.), C. Brontë (q. v.), Disraeli (q. v.), Dickens (q. v.), Thackeray (q. v.), 'G. Eliot,' Kingsley (q. v.), Trollope (q. v.), Reade (q. v.), W. Collins (q. v.), Black (q. v.), Blackmore, &c. See Chambers's *Cyclopedia of E. L.*; Craik's *Hist. of E. L.* (2 vols.); Taine's *Hist. of E. L.*; Warton's *Hist. of English Poetry*; Hazlitt's *English Poets and Age of Elizabeth*; Skeat's *Specimens of E. L.*; Morley's *English Writers*; Bernhard Ten Brink's *Geschichte der Englischen Litteratur* (Berl. 1877).

Engra'ving (Gr. *en*, 'in,' and *graphō*, 'I write'), the art of inscribing figures, letters, or ornaments on surfaces of metal, wood, or stone. E. is usually practised either for ornamentation or for printing impressions from the incised lines. E. on stone, as distinct from lithography, belongs to the first class, and is known as sculpture or stone-carving, and ornamental E. on wood is termed wood-carving. The production of engravings on wood (woodcuts) for the transfer of impressions to paper is designated wood-E. Ornamental E. of metallic surfaces is called chasing. The term E. is principally applied to the art of engraving pictures on copper or steel plates. In the higher ranges of the art fine instinctive touch and pure artistic feeling are as necessary as technical or manipulative skill. Here, however, we have only to do with the technical aspect of E.

In printing from types, stereotype plates, or woodcuts, it is the elevated portions which receive the ink and transfer their impressions to paper; but with engraved copper or steel plates the case is exactly reversed, and it is into the incised lines or dots that the printing ink is placed, to be brought in contact with the paper by pressure. The breadth and depth of the incised lines, therefore, determine the boldness of the impression, and it is this circumstance that gives to copper or steel engravings their singularly fine delicacy of line and rare gradations of tone.

The tools and materials used by the engraver are few. The chief are the set of *gravers*, short prisms of steel fitted into handles, and varying in the size of the point and in the form of the face from a square to a lozenge. The *etching-point* or *needle* is like a large sewing-needle fixed into a handle. Several of these are required, varying in thickness, some being oval-shaped to produce the broader lines. The *dry-point*, similar in shape to the etching-point, is used for more delicate lines, and differs in its effect from the graver by not taking the metal clean out, but throwing it up on each side. The *scraper* has three fluted sides, and is used to remove the barb left by the action of the graver, needles, or dry-point. The *rubber*, a roll of cloth dipped in oil, smooths the surface. The *burnisher* is employed to erase any scratches, to polish and soften any parts engraved or bitten in too dark. The engraver also uses a *bridge*, or thin board for raising his hand above the level of the plate, and a *blind* of tissue paper to direct light on the plate. The different styles of E. on metal plates are known as etching, line E., mezzotint, and aquatint.

In etching, the plate of copper is first covered with a composition known as *etching-ground*, capable of resisting the action

of aquafortis. It consists of black pitch, white wax, burgundy pitch, asphaltum, and gum mastic, mixed by firing. A pencil drawing of the subject on paper is then placed face down on the plate, and transferred by being passed through a press. The workman with his points or needles follows the lines of the drawing, removes the ground, and thus exposes the part of the plate covered by the drawing. A wall of wax is put round the plate, the acid is poured on and left till it has *bitten* deep enough, when it is washed off. Those parts which are corroded enough are covered with a *stopping ground* of lamp black and Venice turpentine, and the acid is again applied, this being repeated till the required depths are obtained. Steel plates, owing to their hardness, require a different biting agent, consisting of a mixture of pyroligneous and nitric acids and water, after the application of which the plate is carefully dried to prevent rust. In *line E.*, so called from the effect being produced by lines of different thicknesses running more or less parallel, the plate is first etched and afterwards finished with the graver, or it may be solely cut by the graver or dry-point. The former is the method usually employed now. Line E. produces the best work, and occupies the foremost place in the art of E. A ruling machine, which produces parallel lines with great rapidity, is frequently used, but its effects are inferior to those produced by handwork. *Mezzotint* differs considerably in appearance from any other style, and is not so difficult work as line E. The ground is carefully indented all over by an instrument called a *cradle*, having a serrated edge, the parts requiring lightness of shade being smoothed with the scraper and burnisher, those parts left untouched giving the deepest shades. Sometimes the design is first etched on the plate. In *stipple E.* the plate is first covered with the etching ground, and the design transferred in the usual way. The outline, instead of being drawn in lines, is put in by dots, wide or near, as light or dark shades are required; it is then bitten with the acid, and finished off with the graver. *Aquatint E.* is the most difficult of any of the styles, and is now superseded by lithography. The plate is covered with a ground of rosin held in solution by spirits of wine, which on drying leaves a granulated surface. The drawing being transferred, those parts requiring the highest lights are 'stopped out' before exposing the plate to the action of the acid, which eats through the granulated ground. This process is repeated as each portion becomes of the desired shade, as many as ten or more separate bites being sometimes required. On paper the aquatint, consisting of flat washes, is like a drawing in India-ink.

Plate-printing is very simple. The plate is first slightly heated, and the ink rubbed in with a linen rag; the face is then cleaned, and the workman rubs off the surplus ink with his hands, which he first covers with whiting. This requires to be done with great care. Damped paper is placed on the plate and covered with blanketing; it is then passed between the cylinders of the press—being raised or lowered by means of a lever—which are turned by a large star handle. The first copies, termed *proofs*, are the finest impressions, as the rubbing of the plate tends to erase or smooth the lines. After a certain number are taken the plate requires to be recut. By a valuable process, termed *acierage*, an engraved copperplate may now be protected with steel. It was invented by M. Garnier, and introduced from France by M. Joubert. By means of electricity an infinitesimally thin skin of iron is deposited upon the copperplate, which may be removed and replaced by a new deposit. See the works of Georges (Par. 1862); Ottley (Lond. 1816); Passavant (Leips. 1860–66); Bartsch (21 vols. Vienna, 1803–21); Bryan (Lond. 1858); Hamerton (1866).

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Engross'ing (Fr. *engrossir* 'to increase'), in law, is the purchasing of victual at a fair or market, or of corn in the field, with the view of reselling at an advanced price. E. was at one time criminal in England, under statutes repealed by 12 Geo. III. c. 71. It was then found that E. was an offence at common law. E. was declared legal by Act 7 and 8 Vict. c. 24.

Enharmon'ic In'terval, in music, a small interval between a pair of notes which go by one name but which differ slightly with the key of the music. Thus suppose a note to vibrate 768 times per second, and to be the tonic of a piece of music, the supertonic, a whole tone above it, will vibrate $\frac{9}{8}$ times as fast, or 864 times per second. If, however, the given note be the Dominant (q. v.), the next note above it in the same scale, the superdominant, will vibrate only $\frac{10}{9}$ times as fast, or $853\cdot\dot{3}$ times per second. Upon such instruments as the piano these two notes are represented by one only, but with the human voice, the violin, &c., they can easily be distinguished. The interval between them—having in this case the vibration ratio $864 : 853\cdot\dot{3}$, $= 81 : 80$, and being therefore equal to a Comma (q. v.)—is one of the most common examples of enharmonic intervals.

Enkhuiz'en ('Narrow houses;' in Lat. *Enchusa*), a decayed town of N. Holland, on the E. shore of the Zuider Zee, 20 miles E.N.E. of Alkmaar. It has a fine townhouse, a cannon foundry, and some shipbuilding, &c. E. was formerly a place of 40,000 inhabitants, with a large herring-fleet, but the silting up of the harbour led to its decline. Paul Potter was born here in 1625. Pop. (1873) 4925. E. was founded in the beginning of the 13th c.

Enlist'ment in the Army, Law Regarding. By the Army Enlistment Act (1870) no one can be enlisted as a soldier for longer than twelve years. The Act provides that enlistment shall be either for the whole of the said period in any service, or for a portion thereof, to be fixed from time to time by the Secretary of State, and specified in the attestation paper, in army service, and for the residue of the period in the first-class reserve force established in 1867. But it is provided that the Act of 1870 shall not interfere with her Majesty's power to enlist men for a shorter period than twelve years. The Secretary of State is empowered from time to time to make general or special regulations, varying the conditions of service, so as to permit a soldier who has served for not less than three years to enter the reserve force for the residue of his term of twelve years. The Act makes provision in case of imminent national danger or of great emergency. If an apprentice enlist, his master may recover him under the Mutiny Act. Every recruit must appear before a magistrate and declare that he enlists willingly. If he repent of his engagement with the recruiting officer, he may buy himself off by paying £1. Servants enlisting before the expiration of their engagement may be held to be validly enlisted under the Annual Mutiny Act.

Enlistment, Naval, Law Regarding.—By 16 and 17 Vict. c. 69 the compulsory service of seamen may extend to ten years. The bounty given varies according to the requirements of the service. The Act 22 and 23 Vict. c. 40 provides for a reserve volunteer service of five years in time of emergency. This force may be trained for twenty-eight days each year, and may be required to join any ship the Admiralty think fit. The corps may be called to service by proclamation. By 26 and 27 Vict. c. 69 the Queen may accept offers of merchant sailors to serve in the Royal Navy, subject to rules framed by the Admiralty. Men called out for training receive pay; if disabled in service, they are entitled to allowances; and if killed, their widows receive pensions.

Enn'is (Gael. *inis* or *innis*, 'an island,' also 'a meadow girdled by a river'), the capital of County Clare, on the Fergus, 25 miles N.W. of Limerick by railway. The chief buildings are the courthouse, the endowed and national schools, an infirmary, and a public library. A colossal white limestone statue of O'Connell, by Cahill, was erected in 1863. The Fergus is crossed by four bridges. E. has flour-mills, breweries, distilleries, and an active trade in grain, cattle, and limestones. It sends one member to Parliament. Pop. (1871) 6101.

Enniscorth'y, a town of Wexford county, on the Slaney, 27 miles S.S.W. of Arklow by railway. It has a splendid church, a factory for frieze, flannels, and blankets, a large distillery, and a river-trade in coal, corn, timber, &c. The two parts of the town are linked together by a stone bridge. Pop. (1871) 5804. E. grew up around the castle of the Anglo-Norman invader, Raymond le Gros, which is still almost entire.

Enniskill'en (Gael. *Inis-Cethlenn*, 'Cethlenn's island'), the capital of County Fermanagh, on the Erne, 75 miles W.S.W. of Belfast, and on the North-Western Railway. It stands near the S. end of Lower Lough Erne, and has manufactures of linen,

strawplait, cutlery, whisky, leather, &c., and a trade in coal, provisions, and timber. Pop. (1871) 5906. E. sends one member to Parliament. It was founded by Protestant settlers, and received a municipal charter in 1612. It supported the Protestant cause in 1689. Here the troops of William III., 1500 strong, gained a signal victory over the forces of James II., consisting of 6000 men, 30th July 1689. The famous regiment of the 6th Dragoons ('Enniskilleners') was originally recruited at E.

Enn'ius, Quin'tus, the father of Roman epic poetry, fondly styled by his countrymen *noster Ennius*, was born at Rudiæ, in Calabria, 239 B.C. He claimed descent from the ancient lords of Messapia, and is said to have served with distinction as a soldier, and risen to the rank of centurion. Cato the Elder on his way home from the African war met E. at Sardinia and brought him to Rome. During the Ætolian campaign he accompanied M. Fulvius Nobilior, by whose son's influence he afterwards obtained the rights of a Roman citizen. E. maintained himself by teaching the Greek language to patrician families. He died of gout, B.C. 169. By the desire of Africanus he was buried in the tomb of the Scipios. E. wrote, in eighteen books, the *Annales* of Rome in hexameter verse, besides dramatic and satirical compositions. His style is necessarily rough, but the vigour of his verse won the admiration of Cicero, Horace, and Virgil. The works of E. are said to have existed as late as the 13th c., but only fragments now remain. Of the collections, the first is that by Robert and Henry Stephens (Par. 8vo, 1564); the best are those of Hessel (Amst. 1707) and Vahlen (Leips. 1854). See Ribbeck's *Scenicæ Romanorum Poesis Fragmenta* (2 vols. Leips. 1852–55); Sellar's *Roman Poets of the Republic* (Edinb. 1863), and Teuffel's *Geschichte der Römischen Literatur* (Leips. 2d ed. 1871).

Enns, a picturesque river of Austria, rises in the S.W. of Salzburg, in the Noric Alps, and flows S.E. by E., then N., entering Upper Austria (*Ober der Enns*), which for 15 miles it separates from Lower Austria (*Unter der Enns*), and eventually joins the Danube, 11 miles S.E. of Linz, after a course of 160 miles, in part navigable.

E'noch. 1. The eldest son of Cain.—2. The son of Jared, who 'walked with God: and he was not; for God took him,' at the age of 365 years (Gen. v. 18–24). This was understood by later Jews to mean that he was taken up to heaven without dying (Heb. xi. 5). Comparative mythology, however, professes to see in the history of E. an old myth about the year, which after 365 days is not. The name may be translated 'Renewal,' and his age, which is shorter than that of any of the other patriarchs, is exactly as many years as there are days in a solar year. This interpretation is curious, but not convincing. See Ewald's *Geschichte des Volkes Israel* (Eng. transl., new ed. Edinb. 1875).

Enoch, Book of, one of the principal of the Old Testament Apocryphal books, written, according to the best authorities, in Hebrew, wholly or in part, about a century before Christ, was widely circulated, and exercised a great influence during the first Christian centuries. From the time of Augustine (354–430), however, it was only known in fragments till 1773, when an Ethiopic version (probably made from the Greek version known to the early Fathers), in three MSS., was brought from Abyssinia by Bruce the traveller. The author gives elaborate descriptions of the world of spirits, of the future life, of the Sheol, with its different divisions, the place of the wicked and of the fallen angels, of the person and times of the Messiah. A great deal of the language of the New Testament—in Christ's discourses, the Epistles, and the Apocalypse, especially that describing the judgment of the last day—seems to have been derived from the B. of E. A translation was published by Archbishop Lawrence in 1821, as well as an edition of the Ethiopic text in 1838. The best edition is Dillmann's (1851). Among special works on the subject are those of Ewald (1854) and Philippi (1868).

E'nos (*Ignos*), an ancient town in the vilayet of Adrianople, Turkey, on a promontory at the S.E. side of a small gulf of the same name, at the mouth of the Maritza, 75 miles S. by W. of Adrianople. It has a shallow harbour, and may be expected to decline now that Dédé-Agatch, a port in the vicinity, has been connected with Adrianople by rail. Its trade amounts to some £33,000 yearly, and the exports are corn, hides, &c. Pop. 7000, principally Greeks. E. is the *Ainos* of Homer, and according to Virgil was founded by Æneas on his way from Troy.

Enrol'ment, a term of English law. By two statutes of Henry VIII., to pass an estate of inheritance the deed of bargain and sale must be enrolled in one of the courts at Westminster, or with the Custos Rotulorum in the county where the land lies, within six months after date. The statute 5 Eliz. c. 26 authorises the courts in the counties-palatine to enrol bargains and sales in like manner. Deeds to bar the entail of an estate, and for some other purposes, must also be enrolled in Chancery. Any one wishing to prevent E. must present a petition for rehearing, or lodge a Caveat (q. v.).

Ensche'de, the most important cotton-manufacturing town in the Netherlands, province of Overyssel, 55 miles N.E. of Arnhem by railway. It has a large number of steam-power looms, and produces cottons for foreign export, fustians, dimities, &c. There are also extensive dye-works and bleaching-fields. A part of E. was destroyed by fire in 1862. Pop. (1873) 5072.

En'sign (Fr. *enseigne*, Lat. *insigne*, 'a mark, or flag,' from *in* and *signum*), the generic name for a flag used as a signal, is specifically employed to designate the large flag that floats at the gaff of a ship when under sail, and above the poop when at anchor. Since 1864 all British ships of war carry the St George's E., a white flag with a large red cross and a small union-jack in the left-hand upper quarter. The red E. with union-jack is used by transports, &c.; the blue in the merchant service.

Ensign, properly *E.-bearer*, was formerly a commissioned officer of the British army, called into existence for the discharge of a special office. The E. was the bearer and defender of the regimental colours; and when battles were decided by a series of hand-to-hand encounters, his office was one of honour and responsibility. The colours are now kept by the colour-sergeants. The junior subaltern rank has been that of sub-lieutenant instead of E. since 1871.

Entab'lature, in classical architecture, is the superstructure which lies horizontally (like a 'table'—from Fr. *table*) upon the columns, and which is divided into three sections—the *architrave*, which rests immediately upon the columns; the *frieze*, the intermediate space; and the *cornice*, the upper section. To each of the orders belongs a special E. of its own, the height and relative proportions of which are regulated according to a scale, the diameter of the column being the unit of measurement. Each of the divisions of the E. is in the different orders enriched with appropriate mouldings, facial, foliage, scroll-work, &c.

Enta'da, a genus of Leguminous plants, belonging to the *Mimoseæ*, or 'gum-arabic' group, and represented by the *E. scandens*, a climbing-plant of the W. Indies. These plants have pinnate leaves and large pods containing the seeds embedded in a glutinous substance. *E. pursætha* grows in the E. Indies, and its pods attain a length of from 4 to 5 feet long, containing beans or seeds of proportional size.

Entail' (Fr. *taillé*), a term in English and Scotch law. In the latter it is frequently called *tailzie*. By a deed of E. the legal course of succession to land is barred, and an arbitrary one substituted, the object being to preserve lands in one family. (See DONIS, STATUTE DE.) There are two kinds of entails—*general* and *special*. When lands are given to a man and the heirs of his body without restriction, this is called an estate tail general; but where there is a limitation to certain heirs, it is an estate tail special. There are also estates tail *male* and estates tail *female*. In the former the succession is limited to males, in the latter it is limited to females. Formerly tenants in tail in England used to evade the limitation by a process called a recovery (see RECOVERIES and FINES), but by the Act 3 and 4 Will. IV. c. 74 they can now make an effectual alienation by a deed enrolled in Chancery; and by 1 and 2 Vict. c. 110 an estate tail is rendered liable for the debts of the tenant. In Scotland various amendments of the law of E. were introduced by the Act of 1848. By this Act an heir of E. in possession is empowered to disentail an estate, in some cases without, and in some cases with, the consent of one or more of the substitute heirs. In entails dated on or after 1st August 1848, an heir born *after* the E., being of full age, is entitled to execute a disentail under the authority of the court, without any consents. Born *before* the E., he may do so with the consent of the heir-apparent, which expression is defined by the Act to mean 'the heir who is next in succession to the heir in possession, and whose right of succession, if he survive, must

take effect.' The heir-apparent, however, must have been born after the date of the E., and at the time of giving his consent must be twenty-five years of age, and of legal capacity.

Entell'us Monk'ey (*Presbyter Entellus*), a species of Catarhine or Old World monkeys, distinguished by the last molar of the lower jaw possessing five tubercles. The muzzle is not over-prominent. The thumbs are very short, and the tail is of great length. This monkey inhabits China and India. It attains a length of 3 or 4 feet, and is greyish brown, a dark-brown line passing along the back and loins. The face and feet are black. The E. M. is the 'sacred monkey' of the Hindus, and is protected by law.

Enter'ic Fever, commonly called **Ty'phoid Fever**, is one of the most fatal scourges of this country. It is a continued fever, associated with an eruption on the skin, occurring in crops, each spot continuing visible for about three days. The eruption occurs on the eighth or twelfth day, and varies much in degree. It is sometimes preceded by a very delicate scarlet tint of the whole skin, resembling the rash of scarlet fever, and consisting of slightly elevated papulæ, which may escape detection owing to the faintness of the colour, unless the skin be examined by passing the finger gently over its surface. The apices of the papulæ are invariably lens-shaped or rounded; they are circular and rose-coloured, and *they disappear completely on pressure*, and resume their characteristic appearance whenever the pressure is removed. The eruption is most common on the abdomen, thorax, and back. Each spot continues visible only for three or four days. This eruption, however slight, is absolutely diagnostic of E. F. Abdominal pains and diarrhœa are amongst the earliest symptoms, the discharges being copious, of a bright yellow colour, devoid of mucus, alkaline, containing soluble salts and albumen, and of a peculiarly offensive odour; the belly is swollen and tympanitic, painful on pressure, and gurgling can be detected in the right iliac fossa; the pulse is generally soft and variable; the tongue is swollen, red, glazed, and fissured, and as the disease advances, it becomes dry and is covered with a pale brown fur. The disease may be always recognised when there is *in the evening* a persistent elevation of temperature, and a remission *in the morning*. In mild cases the disease continues at its height for a week or a week and a half; in severe cases it lasts from two weeks and a half to three weeks and a half. The period of abatement is irregular. The mean duration of E. F. is twenty-four days. The disease varies much in intensity, and is often accompanied by delirium from the first. E. F. ranks among infective diseases of a contagio-miasmatic character, the poison being a living organism, which, when transmitted from a diseased to a healthy individual, produces the same disease in the latter. The chief, and perhaps the only, vehicles of the poison are the dejecta of the bowels of the infected person, either in a solid or gaseous condition. It is generally supposed that the poison of E. F. is inactive immediately after it is discharged from the diseased bowels, and that it goes through some kind of development before it again assumes its active condition. When the germs, even in their active condition, enter a healthy organism, they remain for some time innocuous. This disease has been more thoroughly investigated than any other, and it has been clearly demonstrated that E. F. is essentially a filth disease. The most severe epidemics of E. F. have been traced to water contaminated with the dejecta of E. F. patients, to polluted air, and also to the use of milk coming from dairies where there was E. F. By sanitary precautions, scrupulous cleanliness, the use of disinfectants, and the isolation of patients, the disease may be eradicated. See Dr Murchison, *Treatise on Continued Fevers* (Lond. 1873); Dr Budd, *Typhoid Fever, its Nature, Mode of Spreading, and Prevention* (Lond. 1873); Liebermeister, art. *E. F.* in Ziemssen's *Encyclopædia of Medicine*; Dr Klein's *Report on the Intimate Anatomical Changes in Enteric or Typhoid Fever*, in the Reports of the Medical Officer of the Privy Council and Local Government Board, new series, No. vi., 1875.

Enteri'tis, or **Inflamma'tion of the Bowels**, may attack the muscular or serous coats, and most frequently has its seat in the ileum. The chief seat of pain is the region of the umbilicus, or the right iliac fossa. It is usually accompanied with diarrhœa, and the discharges relieve, for the time being, the griping pains. Serous inflammation of the small intestines may be inferred when there is inflammatory fever, abdominal pain and tenderness, and a discharge of large quantities of serous fluid. In severe cases, ulceration of the free or adherent surface of the mucous membrane, of the sub-mucous tissue, of the solitary glands, and of the muscular tissue, frequently takes place, and causes peritonitis, ending in death. E. is frequently confounded with cholera, a disease with which it has nothing in common, except abdominal pain and serous diarrhœa. E. may be caused by external injury, by poison, by irritating indigestible substances in the bowels, by cold, or by the action of other diseases, as enteric fever, cholera, dysentery, &c. When the causes are so diversified, no single mode of treatment can be indicated; but it is usually advantageous to administer a purgative of castor-oil, with an opiate for an adult, and to apply fomentations or turpentine stupes over the abdomen. Enemata are also of great use (see CLYSTER), as also the warm bath, and a flannel roller firmly applied round the abdomen. The diet should consist entirely of arrowroot, sago, tapioca, gruel, barley-water, milk, and occasionally beef-tea. E. is a common disease amongst cattle, and should be treated on the same general principles. Aloes, or any purgative of an irritating nature, should never be given, but only oil and large clysters.

Entomol'ogy (Gr. *entomon*, 'an insect,' *logos*, 'a discourse'), the department of zoology devoted to the investigation of the habits, structure, and classification of Insects (q. v.). The special cultivation of E. was characteristic of a past era in zoology. The labours of naturalists are now limited not to the mere collecting and naming of species, but extend to the study of structure and development and of the relations of one species to another. The entomologist of the past was a mere collector of insect species. The entomologist of the present is a thorough general zoologist with a special aptitude for the investigation of the organisation of the insect class. The study of the insect world necessarily becomes most attractive in view of the many uses which insects serve in the economy of nature, such as the fertilisation of flowers and the removal of decaying matter. But no less do the phenomena of Metamorphosis (q. v.), and of insect structure generally, offer subjects of the highest interest to the zoologist. The special study of E. dates from about the 17th c. Ray, Leeuwenhoek, and Swammerdam are the chief representative writers of this date on insects, and Linnæus also did much to promote the study. Latreille was an earnest investigator in E., whilst the famous writings of Kirby and Spence and of Mr Newport bring us to more modern times. The Entomological Society of London devotes itself exclusively to the study of insects.

Entomos'traca (Gr. *entomon*, 'an insect,' and *ostrakon*, 'a shell'), a division of *Crustacea* represented by such forms as water-fleas (*Cyclops*, *Daphnia*, &c.) and other related organisms. The E., in modern acceptation, are aquatic animals, and possess a horny shell or carapace of one or more pieces. The gills are attached to the feet or jaws, and the limbs are jointed and provided with *setæ* or bristles. E. exhibit *ecdysis*, or moulting of their shells. The typical E. belong to the orders *Cladocera*, *Copepoda*, and *Ostracoda*. The latter group includes the common water-flea of fresh waters (*Cypris*), which possesses a bivalve shell. The orders of E. which appear to possess a less evident relationship with the commoner forms are the *Phyllopoda* or brine-shrimps, *Trilobita* or trilobites, and the *Merostomata* (soldier or king crabs), &c. The fossil species of E., chiefly forms belonging to the *Ostracoda*, &c., appear first in Silurian rocks. The Carboniferous rocks contain plenty of E.; and species still living are found in Mesozoic and Kainozoic strata, as *Cypris*, *Cythere*, and *Bairdia*.

En'tophytes (Gr. *entophyta*, from *entos*, 'within,' and *phyton*, 'a plant'), a name given to plants growing parasitically on animals—chiefly lower Fungi (q. v.) and Algæ (q. v.). Diseases of various kinds may be produced by the growth of vegetable parasites. Many caterpillars are infested by fungoid growths which kill these larvæ; and in *man* fungi appear to be the chief, if not the sole, causes of such skin and scalp affections as ringworm, &c. The term E. is also applied to plants which are parasitic on other plants, but it is used vaguely in botany. Many of the so-called E. are capable of producing serious disease in their plant-neighbours. Thus wheat is attacked by a low form of plant life named the *Uredo caries* which attacks and wastes the wheat grains. Smut or dust-brand in corn is produced by the *Uredo segetum*, which destroys the inner parts of the flower. Another fungus (*U. rubigo*) produces disease in corn and grasses. The well-known Ergot (q. v.) of rye, wheat,

and barley is supposed to result from the attack of a special fungus. The potato disease, through the recent researches of Mr Worthington Smith, appears to be caused by a fungus (*Peronospora infestans*), the filaments of which emerge from the *stomata* or breathing-pores of the leaves, and produce seeds, which in their turn burrow into the leaves and perpetuate the disease.

Entozo'a (Gr. *entos*, 'within,' and *zōon*, 'an animal), a term given to such animals as live parasitically in the interior of other animals. It was formerly used in a zoological sense, but is now discarded because of the heterogeneous assemblage of forms which this name brought together. As used in a general sense—the only way indeed in which the term E. can be used—this name indicates such animals as the tapeworms, flukes, roundworms, threadworms, and other animal organisms which reside permanently or temporarily within the body of man or of other animals. The most common habitat of E. is the digestive system. The tapeworms infest this system in their mature state, as also do the round and thread worms. They are also frequently found in the muscular system. While immature, many of the tapeworms in the form of cystic worms or *Scolices* select the muscular system as a resting-place. Some of these cystic forms inhabit the brain, liver, and other organs. The presence of an immature *Tænia* in the brain of the sheep produces 'Staggers' (q. v.), while the larval forms of *T. echinococcus*, another tapeworm, in the liver of man produces the serious lesion known as *hydatids*. The common fluke (*Fasciola hepatica*) has its seat in the liver of sheep, and causes the 'rot' of veterinarians. Certain peculiar forms of E. named *Hæmatozoa* occur in the blood of man and other animals; and, although still a matter of doubt, *Bacteria* and *Vibriones* may also be included as E., since they appear plentifully in morbid as well as healthy tissues. The great majority of E. belong to the class *Scolecida*, one of the divisions of the *Echinozoa* or *Annuloida*. Some insects, such as the larvæ of the bot-flies (*Œstrus*), are parasitic in horses and other animals during the earlier stages of their existence, and afterwards escape from the digestive systems, to pass in the ground their pupa or chrysalis stage. Some remarkable instances of *pseudo-parasitism*, named *commensalism*, have been related—fishes living in the stomachs of sea-anemones and of sea-cucumbers, and passing freely in and out of the bodies of their hosts. Certain pea-crabs are only known as parasites within molluscs, such as mussels, and sea-squirts or Ascidians. The writer has taken a pea-crab an inch long from the interior of a mussel-shell, and he has frequently seen the same crabs emerge from the bodies of sea-squirts in aquaria to seek for food, and again re-enter. Such animals are truly E. The history and development of E. bear an important relation to public health, since these parasites are capable of causing serious disease. (See TRICHINIASIS.) Preventive measures are examination of food and attention to cooking.

Entr'act, a short piece of music between the acts of a play.

En'tré Dou'ro e Min'ho or **Minho**, a maritime province in the N.E. of Portugal, lies between the rivers Minho and Douro, as its name implies, and is bounded W. by the Atlantic, and E. by Traz oz Montes and by the Spanish province of Orense. Area, 3094 sq. miles; pop. (1872) 965,040. It is famed alike for the rich beauty of its scenery, and for its rare fertility. In the E. it is entered by three hill ranges, which reach their greatest height in Monte Cavarra (7880 feet). Along the coast there is a fine stretch of undulating cultivated country. The chief rivers, besides those that form the N. and S. boundaries, are the Limia, Cavado, Ave, Neiva, and the Tamega, an affluent of the Douro. Among the productions are wine, oil, flax, maize, wheat, barley, oats, and Southern fruits. The province is noted for the excellence and quantity of its port-wines. Braga is the capital, and the chief towns are Guimaraes, Caminha, Vianna do Castello, and Pavoa de Varzim. Oporto, included in Beira, is the principal harbour and place of trade.

En'tré Ri'os (Sp. 'between rivers'), a state in the E. of the Argentine Republic, bounded W. and S. by the Paraña, E. by the Uruguay, and N. by the state Corrientes. Area, 29,955 sq. miles; pop. (1869) 134,271. It is intersected from N. to S. by a range of hills, but the plains are swampy, and are exposed to yearly floods. The chief occupations are cattle-rearing and hunting, and the exports comprise hides, horns, tallow, &c. The largest town is Paraña.

Entro'pium (Gr. *en*, 'in,' and *trepō*, 'I turn'), a turning in of the eyelashes or eyelids against the eyeball, causing much irritation, and often inflammation of the cornea. Relief may be obtained by plucking out the cilia with the forceps, but a surgical operation is generally necessary.

En'try, Right of, a term of English law signifying the right of one who has been wrongfully ousted from land or from a tenement. By 3 and 4 Will. IV. c. 27, the right is in certain cases lost by not vindicating it for twenty years.

Entry of an Heir. In Scotch feudal law this term is applied to the recognition of the heir of a Vassal (q. v.) by the Superior (q. v.). On the death of the vassal the *Dominium Utile* (q. v.) returns to the superior, to be again given to the heir. The superior, however, is bound to grant a warrant for infefting (see INFEFTMENT) the heir pointed out by the charter in virtue of which the *dominium utile* is held by the superior.

Enure', a term of English law signifying to take place or to be available.

En'velope (Fr. *envelopper*, 'to wrap up,' formed from a root *velop*, whose origin is unknown), a cover for letters or papers which has only come into common use since the introduction of the uniform charge for postage (1840). The consumption of envelopes is now prodigious. In 1871 not fewer than 5,159,000,000 passed through the post-offices of the various countries of the globe. Many ingenious machines have been devised for automatically performing the operations of cutting, folding, and gumming envelopes. In cutting out the blank shapes waste is avoided by using angular cutters or a cutting die on a pile of paper. The folding, embossing, and gumming are done by girls or machines. The most perfect E.-making machines are those of De la Rue, Poirier & Antoine of Paris, and G. W. Reay of New York, the last performing all the operations of picking up single blanks, creasing, gumming, folding, and delivering, and requiring but one attendant.

En'voy (Fr. *envoyer*, 'to send,' from Lat. *in* and *via*, 'a way'), a person despatched on a mission, a diplomatic minister of the second order. E. extraordinary and minister plenipotentiary is the chief foreign representative of the United States. See EMBASSY.

E'ocene (Gr. *eōs*, 'dawn,' and *kainos*, 'recent'), the name given by Lyell to the series of strata at the base of the Tertiary formations, which contains among its fossils not more than 5 per cent. of existing species. It is subdivided into three great groups. 1. *The Lower E.*, forming the London basin, rests in apparent conformability upon the chalk, and comprises (*a*) the *Thanet Beds*, light-coloured quartzose sands; (*b*) the *Woolwich* and *Reading Beds*, a mixture of sands and clay; (*c*) *London Clay*, chiefly a dark-coloured clay containing nodules of ironstone. 2. *The Middle E.* consists of (*a*) the *Bagshot Beds*, light-coloured sands and marly clay; (*b*) the *Headon Series*, two groups of calcareous fresh-water deposits, separated by sandy strata of marine origin; (*c*) the *Osborne Series*, shelly sandstone and yellow limestone below, and light-coloured sands, clays, and marls above. 3. *The Upper E.* is divided into (*a*) the *Bembridge Beds*, pale-yellow limestone, capped by an oyster-bed and several beds of clays and marls; and (*b*) the *Hempstead Series*, dark, white, and coloured marls and clays. In the Brussels and Paris basins a very similar series of beds is found, and large masses of rocks belonging to the Middle E. are met with from the Alps along the Mediterranean shores, through Egypt to the Himalayas. In America there are two contemporaneous series, the Lignitic and the Alabama—the former furnishing a passage from the chalk to the true E. The traces of life in E. are of a tropical nature. The flora is especially rich in America, comprising cinnamon, fig, and melon trees, gourds, palms, conifers, &c. Among the fauna there is a large development of Gasteropods. Reptiles, such as turtles, crocodiles, snakes, are plentiful, and among mammals the *Pachydermata* are typical fossils. The more important divisions of the E. are treated under separate articles.

Eo'lian Harp. See ÆOLIAN HARP.

E'olis, or **Œ'olis**, a genus of Gasteropodous mollusca, of the family *Œolidæ*, section *Nudibranchiata*. They have no shell, the gills being on the sides of the body. They are found on our coasts, crawling over the stones at low-water mark like slugs, are usually of bright colour, and have the sides provided with flexible processes.

Eón de Beaumont. See D'Eon, Chevalier.

Eötvös, Jozef, an illustrious Hungarian author, born in Buda, September 3, 1813, studied for the bar at Pesth after giving up all his means to pay his father's debts. Entering the public service, he at the same time cultivated literature with success. Dramatic writings, such as *The Critics*, a comedy, were followed by *Karthausi* ('The Carthusian,' 1838–41), a sentimental philosophical novel. Several political essays on prison reform, Irish pauperism, and emancipation of the Jews, were the fruit of a tour through Europe. But the works of imagination by which E. is most endeared to his country and best known abroad are *A' Falu' jegyzöge* ('The Village Notary,' Eng. trans. by Wenchstern, 1850), in which he ridicules the county institutions of Hungary; and *Magyarorszâg 1514-ben* ('Hungary in 1514'), a story of the great peasant insurrection, the moral of which was that the nobles should surrender their feudal privileges in peace. E. ranged himself with the Centralist party of Deak and Batthyanyi, Von Pulsky and Kossuth. He wrote in the *Pesti Hirlap* in favour of equal taxation, &c. In 1848 he became Minister of Education under Batthyanyi; but conscious of practical incapacity, and perhaps afraid of the revolution, he retired to literary life in Munich, where he published a work on modern political ideas, a subtile pamphlet on the rights of nationalities. On the publication of the Diploma of 1860 and the Patent of 1861, E. once more co-operated with Deak in securing the Dual Constitution, which has given self-government and political strength to Hungary. In 1867 he became Minister of Education and Public Worship, and had to encounter very delicate problems of religion and language. He died 3d February 1871.

E'ozoön Canaden'se, or 'Dawn-of-Life Animalcule,' a most interesting organism, supposed to have been a large reef-building species of *Foraminifera*, the fossil remains of which occur in the Laurentian rocks of Canada and in contemporaneous strata in Bavaria and Europe. The E. derives its interest from its being the oldest known fossil of any kind, and, secondly, from the doubt which has been cast upon its fossil nature. The organic character of E. is denied by many palæontologists. Dr Carpenter of London and Principal Dawson of Montreal—the discoverer of the E.—have, however, accumulated such a mass of evidence in favour of the truly fossil nature of the E., derived from a study of existing *Foraminifera*, that the balance of probability is very greatly in favour of the E. being a true fossil organism. The E. consists of a series of chambers lying in tiers one above another. These chambers were occupied by the *sarcode*, a living matter seen in existing *Foraminifera*. Certain living members of the latter group (*Polytrema* and *Carpenteria*) grow in reef-like masses, and hence the reef-like nature and growth of the E. is further established. See Principal Dawson's *Dawn of Life* (1875).

Epacrida'ceæ (Gr. *epi*, 'upon,' and *akros*, 'the top'), a natural order of Exogenous plants in the sub-class *Corolliflora*, mostly natives of Australia, the Indian Archipelago, and the S. Sea Islands. They are shrubs or small trees, and are chiefly notable for their fine heath-like flowers, on account of which they are frequently cultivated in greenhouses. There are 31 genera and about 320 species, the principal one being the *Epacris*. The corolla is generally tubular; the fruit an edible berry or a capsule. The fruit of *Lissanthe sapida* is known as the *Australian cranberry*.

E'pacts (Gr. *epaktos*, 'additional') were a set of numbers substituted for the golden numbers of the ecclesiastical calendar when Lilius carried out the reforms of Gregory XIII. in 1582. The golden numbers (marked with red letters) indicated the position of any particular year in the cycle of nineteen solar years, in which the difference of the solar and the lunar year is cancelled by the insertion of six intercalary months of thirty days, and the addition of one month of twenty-nine days. This cycle is supposed to begin with the 1st of January when the moon is new; and as this occurred in the year before the Christian era, the rule for ascertaining the golden number is:—Add 1 to the date, divide the sum by 19; the quotient is the number of cycles elapsed, and the remainder is the golden number. As, however, the lunar cycle was 1 hr. 29 min. longer than the actual length of 235 lunations, the new moons gradually began to anticipate the golden numbers at the rate of one day in 308 years. After Gregory corrected the excess of the Julian year, the system of golden numbers became unsuitable to the reformed calendar, and the epact was introduced to denote the age of the moon at the beginning of each year of the cycle of nineteen. This increases each year by the difference of the solar and lunar years, viz., eleven days; but every three years the epact is reduced by the thirty days of the intercalary month, except in the first year of the next cycle, when the twenty-nine days of the seventh additional month must be deducted. The E. are therefore 11, 22, 3, 14, 25, 6, 17, 28, 9, 20, 1, 12, 23, 4, 15, 26, 7, 18, 29. The solar equation, however, requires the diminution of the E. by one day three times in 400 years; while the lunar equation requires their increase by one day every 308 years. To avoid confusion, this latter correction is effected in a period of 2500 years, *i.e.*, once in 300 years for seven periods, and then at the end of 400 years. The two equations cancelled each other in the year 1800. A perpetual calendar requires thirty sets of E. In the Church calendar the epact 30 is represented by an asterisk, and epact 25 by an Arabic character, the others being in Roman numerals. If the golden number of a year be above 11, the epact 25 for six months of the year answers to the same day in the calendar as 26; otherwise, to 24. See Calendar.

Epaminon'das, the illustrious Theban soldier and statesman, was born towards the close of the 5th c. B.C., of a poor but noble family. In youth he displayed high intellectual aspirations, which were strengthened by his intercourse with several philosophers, especially Lysis the Pythagorean. E. remained in private life till 379, when he took part with his friend Pelopidas in the revolution by which Thebes was freed from the Spartan yoke. In 371 he represented Thebes in the general peace congress at Sparta, and opposed the ascendancy of the latter with such spirit that Thebes was excluded from the treaty Cleombrotus was dispatched against the Thebans, whom he encountered at Leuctra, 371, but his army was completely beaten by the skill of E., and the prestige of Sparta destroyed. In 369 E. and Pelopidas invaded the Peloponnesus, ravaged the country, threatened Sparta, founded Messene and Megalopolis, and restored the power of the Messenians, who had been most active enemies of Sparta. The victorious generals returned to Thebes to be impeached for retaining the command four months longer than the legal term, but were acquitted. In 368 E. made a brief inroad into the Peloponnesus, in which he took Sicyon and Pellene. In 366, after the 'tearless battle' in which the Spartans defeated the Arcadians, he returned thither, and without changing the existing oligarchies, accepted the Achaian cities as allies of Thebes; but the Thebans reversed his policy. In the same year E., serving as a private soldier, saved the Theban army sent into Thessaly to rescue Pelopidas, and afterwards, at the head of a second army, secured his friend's release. In 363 E. sailed to the coast of Asia with the fleet which the Thebans had equipped against Athens; and on his return from this fruitless expedition, he learned that Orchomenus had been destroyed, and that Pelopidas had been slain in Thessaly. The political complications of the Peloponnesus rendered Theban intervention again necessary, and in 362 E. invaded it for the fourth time. He attacked the enemy near Mantineia, and by renewing the tactics of Leuctra gained a complete victory, though he himself was mortally wounded. The surgeons declared that he must die as soon as the spear-head was withdrawn from his breast. They assured him that his shield was safe, and that Thebes was victorious; but when he learned that the commanders who should have succeeded him were slain, he said, 'You must make peace.' The spear-head was then withdrawn.

Epaule'ment (Fr. *épaule*, 'shoulder;' Old Fr. *espaule* and *espalle*, from the Lat. *spatula*, used by Apicius) is the shoulder-like 'flanking return' or terminal portion of a battery or earthwork. Its object is to secure men and guns against a flank fire or Enfilade (q. v.). The shoulder of a bastion placed at the point where one of the faces and one of the flanks of a fortified work meet is called an *épaule*.

Ep'aulette, a distinctive ornament worn upon the shoulder by naval and military officers. It is a relic of the plates that were introduced in the 14th c. as a defence for the shoulder from sword-cuts. The E. has not been worn in the British army since 1855.

Epée, Charles Michel de l', born at Versailles, 25th November 1712, became an abbé, but had to leave the Church on account of Jansenist opinions. He devoted himself to the education of deaf-mutes, and erected an institution for that purpose at his own expense. He died 23d December 1789. The Constituent Assembly gave effect to E.'s request for a public institution in 1791. E.'s writings all relate to his method, embodied in *La Véritable Manière d'Instruire les Sourds et Muets* (Par. 1784). His *Dictionary of Signs* was continued by his successor, Abbé Sicard. Sicard also extended to syntax the system of signs which E. had applied only to nomenclature.

Epei'ra, a genus of spiders (*Arachnida*) forming the type of a family, *Epeiridæ*, in which the jaws are widened from the base. The eight ocelli or eyes are arranged in a quadrangular fashion, and the skin is soft. The common garden spider (*E. diadema*), or cross spider, is a good example of this genus, as also is the *E. bicornis*. The former makes the well-known geometrical web, and is distinguished by the triple cross-marking on its abdomen. The females greatly exceed the males in size.

Eper'ies (Lat. *Eperesinum*, Hung. *Preschov*), the chief town of Sáros, Hungary, is picturesquely situated on the left bank of the Tarcza, 148 miles N.E. of Pesth. It is walled, is the seat of a bishop, has six churches, a Lutheran college, manufactures of stoneware, linen, and cloth, and a trade with Poland in cattle, linen, and Tokay wine. Near E. is a royal salt-mine. Pop. (1869) 10,772. E. was founded by King Geysa II. in the middle of the 12th c.

Éper'nay (Lat. *Aquæ Perennes*), the chief town of the department of Marne, France, on the left bank of the Marne, here crossed by a bridge of seven arches, 20½ miles W.N.W. of Châlons, and on the railway from Paris to Strasburg. It is the centre of the Champagne wine trade, and has vaults cut in the soft tufa capable of containing 5,000,000 bottles. There are also potteries, wool-spinning mills, tanneries, brandy distilleries, and a trade in wine-flasks, stoppers, &c. Pop. (1872) 12,628.

Ephah, a Hebrew measure of capacity, = 27·83 pints, or 3 English pecks and 3 pints.

Ephe'lis (Gr. 'a sun-freckle'), is the scientific name for sun-burn. E. can be removed when recent by an emulsion of bitter almonds with spirits of wine, or the benzoated oxide of zinc, beaten into a cream with orange or elder-flower water, and when chronic by a lotion of bichloride of mercury, or nitro-muriatic acid.

Ephem'era (Gr. 'for a day'), a genus of Neuropterous insects, including those forms popularly known as 'day-flies' and 'May-flies.' Many are really born in the morning, only to be scorched by the heat of the noonday sun, the evening finding them dead in countless numbers. The family *Ephemeridæ* is distinguished by the five-jointed tarsi and by the large front wings. The abdomen has three appendages, and the head of the larva possesses a 'horn.' These insects undergo an incomplete metamorphosis, the larvæ inhabiting water. The *E. vulgata*, or 'May-fly,' is familiar in our ponds and streams. The metamorphosis may take more than a year. The body is slender and the wings long. The pupa casts off its skin, leaving it attached to water-weeds, and flies into the air as the perfect form or *imago*. Vast numbers of these insects appear suddenly in some localities. They are much used as bait by anglers.

Ephem'era, or Feb'ris Dia'ria, is a slight febrile attack having a slight local cause, and lasting no longer than a single day.

Ephem'eris (Gr. 'a diary'), an astronomical table giving beforehand the positions of a heavenly body. Ephemerides of the sun, moon, planets, and stars are calculated and published annually; those of periodic comets are usually given when they are approaching their perihelia. The *Nautical Almanac*, the French *Connaissance des Temps*, and the German *Jahrbuch* are publications of this nature, and are invaluable to the mariner and traveller as a means of fixing longitude.

Ephe'sians, Epistle to the, according to the unanimous tradition of the Church, was written by the Apostle Paul to the Church he had founded at Ephesus. External evidence is very strong that it was addressed, as stated in chap. i. 1, 'to the saints at Ephesus;' a number of particulars in the epistle, on the other hand, have forced some critics to the conclusion that it was not written by Paul. The difficulty of Paul having written it to the Ephesians may have given rise to the omission from some MSS. of 'which are at Ephesus,' and to the substitution in some of 'to the Laodiceans.' Those who hold the Pauline authorship suppose it to have been written from Rome during the apostle's captivity (Acts xxviii.), about the same time as those to the Colossians, Philippians, and Philemon were written (or about 62 A.D.). According to some, it was written from Cæsarea (Acts xxiv.-xxvi.). See Davidson's *Introduction to the New Testament* (Edinb. 1868).

Eph'esus, the chief of the twelve Ionian cities on the coast of Asia Minor, said to have been founded by Androclus, son of Codrus, at the Ionian migration, stood at the mouth of the river Cayster, in a marshy plain, bounded on the E. and S. by the two hills Prion or Lepre and Coressus. The buildings of the city were partly on these two hills and partly on the plain about the harbour—a lake communicating with the Cayster, the mouth of which formed the outer harbour (Panormus). To the N.E. of the city was the celebrated Temple of Diana. This magnificent building, reared in the 6th c. B.C. by the contributions of all the Greek cities of Asia Minor, in place of the original temple, was destroyed by fire on the night Alexander the Great was born (October 13-14, 356 B.C.). It was restored by the joint efforts of all the Ionian states, was regarded as one of the wonders of the world, had the privileges of a sanctuary, and was again destroyed by the Goths. Nothing now remains but some traces of its foundations. The ruins of several other large buildings are to be seen, besides the foundations of the walls of the city. E. fell successively under the sway of Crœsus, the Persians, Macedonians, and Romans, the last of whom made it the capital of the province of Asia; and from its easy access to the interior and its excellent harbours, it became the chief emporium for trade and the greatest city in Asia Minor. E. was emphatically a sacred city, both from its heathen temple, the rebuilding of which was an epoch in architecture, as then the Ionic order was perfected, and also from its connection with Christianity. Several episodes in St Paul's life are associated with it (Acts of Apostles). According to Eusebius, St John also spent the last years of his life here.

Eph'od (Heb. from *aphad*, 'to gird on') was a vestment worn by the priests among the Israelites when they consulted the Deity or practised divination. It consisted of two parts—one covering the breast and the other the back—fastened to each other on the shoulders by two jewels, on which were engraven the names of the twelve tribes—six on each; and further confined by a girdle passing round the middle. According to Rationalistic critics, the right of wearing the E. and using the Urim and Thummim (q. v.), *i.e.*, of giving oracles, belonged, in the earlier stage of the Israelitish religion, to the priests in general (1 Sam. ii. 18, 28, &c.). Hence Israelites who instituted for their families a religious service of their own, with a priest attached, were said 'to make an E.' (Judges viii. 27; xvii. 5). It was the later priestly legislation (they affirm), reduced to its present form after the Captivity, which assigned the E. and the oracular power to the high priest alone, and by introducing such passages as Exod. xxv. 7; xxviii. 4, *seq.*; xxix. 5; xxxv. 9, 27; xxxix. 2, *seq.*; Lev. viii. 7, produced a manifest anachronism, since they are irreconcilable with such passages as 1 Sam. ii. 18, 28; xxii. 18; 2 Sam. vi. 14; 1 Chron. xv. 27; Deut. xxxiii. 8. But the orthodox school of critics meet the difficulty by supposing that there were *two* kinds of E. in use at the same time, one for the ordinary priest and one for the high priest.

Eph'ori (*ephoraō*, 'I oversee'), a directory of five men in the Spartan government, at first intended to be a check on the kings, but who gradually won the entire control of the state. The E. were said to have been instituted by Lycurgus, but were more probably appointed in a later period. They were chosen from the people, and held office for a year.

Eph'raem Sy'rus ('Ephraim the Syrian'), an ecclesiastical writer, was born probably at Nisibis, and was educated by the bishop of that place, whom he accompanied to the Council of Nice (325). After Nisibis was ceded to the Persians (363) he settled at Edessa, where he became a deacon in (some say abbot of) a monastery, and remained till his death in 378. He was a most ardent devotee of monachism, and a prolific writer against

idolaters, Jews, and heretics of all kinds—Arians, Sabellians, Novatians, Manichæans, Gnostics, Marcionites, &c.; he wrote also commentaries on most of the books of the Old Testament (except the Psalms and Book of Proverbs), sermons, hymns, &c. All his writings—which were so popular that they were read in church along with the Holy Scriptures, and got their author the name of the 'Prophet of the Syrians,' 'Column of the Church,' 'Harp of the Holy City,' &c.—were in Syriac. Those said to have been originally written by him in Greek are partly versions of the original Syriac and partly spurious. They were translated into Greek, Latin, Slavonic, and Armenian. The best edition appeared at Rome (vol. i.-iii. Gr. and Lat., vol. iv.-vi. Syr. and Lat. 1732-46), edited by the Maronite Petrus Benedict and Stephan Evodius Assemani. As an interpreter of Scripture E. adopted a highly allegorical style, often artificial and extravagant. This spiritualising exposition was probably adopted in opposition to the Marcionites, who endeavoured to bring the Old Testament into antagonism with the New by adherence to a grossly literal, unfigurative interpretation. See Lengerke, *De Eph. S. Arte Hermeneutica.*

The name of E. S. is associated with one of the most ancient and valuable extant MSS. of the Bible—Codex C., No. 9, in the Imperial Library at Paris—which contains portions of the LXX. and fragments of every part of the New Testament. The original writing was almost entirely removed about the 12th c. to make room for some of the writings of E. S. in Greek, but has been to a certain extent restored by means of chemicals. Brought from the East to Florence in the 16th c., it came to Paris with Catherine de Médicis, and was published by Tischendorf in 1843-45. See Assemani in *Biblioth. Orient. Vatic.*, and Mosheim's *Church Hist.*

Eph'raim was the younger of the two sons of Joseph, and was counted, like his brother Manasseh, along with his uncles, the sons of Jacob, as one of the twelve patriarchs. The tribe numbered 40,500 at the first census (Num. i.), at the second (Num. xxvi.), 32,500. Its territory lay in the centre of the land of Canaan, and after the separation under Jeroboam, E. was the leading tribe in the kingdom of Israel; indeed it might be said that the history of the latter is neither more nor less than the history of E.

Epichar'mus, a Dorian of Cos, according to Plato 'the prince of comedians,' was born about 540 B.C. E. is said to have studied philosophy under Pythagoras. He resided for a time at Megara in Sicily, and subsequently at the court of Hiero. He gave a new form to the early comedy by freeing it from some, at least, of its buffoonery, and by introducing a regular plot. The titles of thirty-five of his comedies are known. They are generally on mythological subjects. The *Menæchmi* of Plautus is said to have been founded on a comedy of E. Krurmann has edited the extant fragments of E.'s writings (Haarl. 1834).

Epicoroll'æ, or **Epipetal'æ**, a division of Exogenous plants forming one of the subdivisions of *Corolliflorœ*, and characterised by the stamens being inserted on the corolla. To this group the natural orders *Gentianaceœ*, *Convolvulaceœ*, *Solanaceœ*, *Labiatœ*, *Primulaceœ*, &c., belong.

Epic Poetry (Gr. *epos*, 'a discourse'). An epic is a long narrative poem dealing generally with heroic or superhuman persons and events, with romantic or supernatural exploits and adventures. It is distinguished from the narrative poem by greater dignity of style, cohesion of plot, and symmetry of structure; from the drama, in which the author never speaks in his own person; from the lyric, by its great length, and by making the narration of action rather than the expression of emotion its predominant feature.

The three great classical epics are Homer's *Iliad* and *Odyssey*, the former relating the siege of Troy, the latter recounting the wanderings of Odysseus, and Virgil's *Æneid*, on the voyages of the Trojan Æneas and his conquest of Italy, an elaborate glorification of the Augustan age of Rome. The *Niebelungen Lied* is the great Teutonic epic, in which we dimly trace historic persons and events of the 5th c. Its author is unknown; it seems to have been composed between the 7th and 11th centuries. A still older product of the Teutonic muse is the *Tale of Beowulf* (q. v.), which may be regarded as the epic of the Old English peoples. The *Shah Nameh* of the Persian poet Firdusi (937-1020); the *Lusiad* of the Portuguese Camoens (1524-79), on the voyage of Vasco de Gama to India; the *Gerusalemme Liberata* of Tasso (1544-95), on the siege of Jerusalem in the First Crusade, are also famous specimens of the epic; but the *Divina Comedia* of Dante (1265-1321) and the *Paradise Lost* of Milton (1608-1674) are the only two which challenge comparison with the Grecian masterpieces. Besides the great regular epics, there are collections of epic legends, such as Hesiod's *Theogony*, the Norse *Edda* and *Heldenbuch*, the Indian *Mahabhârata*, and the Spanish *Romancero*. The historical epic adheres closer to fact than the heroic; of this class the *Punica* of Silius Italicus is an unfavourable, and the *Brus* of Barbour an admirable, example. The *Orlando Furioso* of Ariosto (1474-1533) holds an intermediate place between the stately serious epic and the mock-heroic or humorous epic, which is represented by the *Battle of the Frogs and Mice*, ascribed to Homer, Pulci's *Morgante Maggiore*, the old German poem *Reynard the Fox*, Butler's *Hudibras*, Boileau's *Lutrin*, Pope's *Rape of the Lock*.

Among the innumerable unsuccessful epics of ancient and modern times may be mentioned the *Argonautica* of Apollonius Rhodius, Lucan's *Pharsalia*, the *Thebaid* of Statius, Lope de Vega's *Circe*, Ercilla's *Araucana*, Ronsard's *Franciad*, Davenant's *Gondibert*, Voltaire's *Henriade*, Klopstock's *Messiah*, Wieland's *Oberon*, and Southey's *Madoc*. Landor's *Gebir*, though wanting in epical length, is epical in structure and style.

Epicte'tus, a philosopher of the Stoic school, was born at Hierapolis, in Phrygia, and flourished towards the close of the 1st c. E. taught first at Rome, but when Domitian banished the philosophers, he retired to Nicopolis in Epirus. The teaching of E. is preserved in the four that remain of the eight books of Commentaries by his pupil Arrian, the historian, and in the *Encheiridion* ('handbook'), compiled from his discourses, by the same writer. E. taught 'that the beginning of philosophy is the perception of one's own inability to do what is needful; that only what is within our choice is good or evil; that nothing external can control our choice; that our choice is determined by our reason; that our resemblance to God consists in our acting according to reason; and that we ought to invoke God's assistance.' It is not wonderful that E. has been considered a Christian, and, though this cannot be established, there can be no doubt that in important respects 'he approaches the Christian doctrine more closely than any of the earlier Stoics.' The best edition of E. is that of Schweighaüser (Leips. 1800).

Epicu'rus, a famous philosopher of antiquity, was born at Samos or Gargettus, near Athens, about B.C. 342. His father was a teacher of grammar. When only eighteen, E. visited Athens; subsequently he went to Athens, Colophon, Lampsacus, and Mitylene. In 302 he opened a school at Athens, where he remained till his death in 272. The famous 'Garden' soon became a dangerous rival of the Porch, the Grove, the Lyceum, and the Cynosarges. Though severely libelled by the Stoics and their admirers, E. seems to have been a virtuous and amiable man. He gave his guests at the Garden barley cakes and fresh water. Philosophy he regarded, not as the instrument of absolute truth, but as the art of reaching happiness. Like Aristippus, he said happiness consisted in pleasure; but the most permanent, the least hurtful, are the pleasures of the mind: virtuous habit and the supremacy of reason are necessary to happiness. As regards the body, the chief thing is to be contented with a little of the simplest; the felt want of luxuries is a great torment. Ignorance, the great obstacle to happiness, is either of the external world or of human nature. To these two kinds of ignorance the *Physica* and the *Canonica*, or Logic, are respectively applied. The former —described in Diogenes Laertius and discussed by Seneca and Cicero (*De Fin.*)—was based on the atoms of Democritus, whose emanations produced sensations. The atoms were subject to physical laws and not to the caprice of the gods. E. added to the theory of Democritus the hypothesis that each atom in its downward course slightly deflected from a right line, and thus became capable of collision and combination. In sensation itself E. admitted there was neither truth nor falsehood; but *prolepsis*, or conception formed by repeated sensation, made possible knowledge, or the classification of the sources of pain and pleasure. Of E.'s 300 works, only three letters are preserved, and some passages of a work on nature, found at Herculaneum. His school was continued by Hermachus, Polystratus, Dionysius, Basilides, till the age of Augustus. Among Romans, Lucretius, Horace, and Lucian are his chief followers. In modern Europe

the system was revived by Gassendi (1590–1655), who wrote a life of E. and a treatise on the philosophy, and adopted by Rochefoucault, Fontenelle, Voltaire, and others. All his disciples, however, do not adopt his views with regard to the fear of death and the fear of the gods, both of which he said were groundless, the soul being simply a compound of air, vapour, and heat, and the gods not being actively interested in human fate. E. also dwelt on the reciprocal advantages implied in justice and friendship. Community of goods, he said, implied mistrust. See Ritter and Preller, *Hist. Phil.*; Bain, *Mental and Moral Science*; and Zeller on *Stoics and Epicureans*.

Ep'icycle (Gr. *epi*, 'upon,' *kyklos*, 'a circle). When the early astronomers, having fixed the earth in the centre of the universe, and given to all celestial bodies what they deemed the most perfect of motions, viz., circular motion, came to compare their system with the true facts of observation, they were necessarily astonished at the great discrepancies which existed. Ptolemy (q. v.) was especially perplexed at the retrogressions and other irregularities of the planets, and to meet this difficulty devised what he termed *epicycles*. The planets were supposed to move in circles, whose centres moved uniformly in a larger circle round the earth. Each planet he found required a different-sized E.; and though his system was extremely cumbrous, especially when viewed in the light of the Newtonian system, it was undoubtedly ingenious. See PTOLEMAIC SYSTEM.

Epicy'cloid is the curve described by a point in the circumference of a circle which is rolling on the outer circumference of a fixed circle. If the rolling take place *inside* the fixed circle, the curve described is called a *hypocycloid*. When the tracing point is not in the circumference, the corresponding curves are known as *epitrochoids* and *hypotrochoids*. If the rolling circle be equal to the fixed circle, the E. becomes the *cardioid*. A hypotrochoid of two circles whose radii are as 1 : 2 is an ellipse, whose eccentricity increases as the tracing point is moved nearer the circumference of the rolling circle, the hypocycloid ultimately produced being a straight line—a diameter of the fixed circle. The E. is of practical importance as being that form for the teeth of a toothed wheel which reduces friction to a minimum.

Epidam'nus. See DURAZZO.

Epidaur'us (originally called *Epicarus*, from its supposed colonisation at first by Carians), a town in Argolis, on the eastern coast of the Peloponnesus. During the historical period it was in the possession of the Dorians. After passing through the phases of a monarchy, an oligarchy, and a tyranny, E. finally reverted to an oligarchy. It was at an early period an important commercial city, and its famous temple of Æsculapius drew invalids from all quarters. The sacred enclosure in which the temple stood is to this day called *Hieron* ('the sanctuary'). E. had also temples to Athena, Artemis, Dionysus, Aphrodite, and Hera; and a magnificent theatre 370 feet in diameter, capable of containing 12,000 spectators. E. colonised the islands of Cos, Calydnus, and Nisyrus. Ægina, another of its colonies, in time almost drained the commerce of the parent city. Its famous temple, however, was still rich in gifts when L. Æmilius Paulus visited it in B.C. 167, after the conquest of Macedonia; but by the ravages of Sulla it was swept of all its votive offerings in common with many other shrines. E. was celebrated for its vines and its breed of horses. The ancient name still survives in the modern *Pidavro*.

Epidem'ic Diseases (Gr. *epi*, 'upon,' and *dēmos*, 'the people') are chiefly distinguished by the circumstance that they attack a number of people in one place simultaneously. They travel from place to place, and break out with great violence, more especially in populous centres, and they may become extinct in a locality to reappear after many years. The best-known E. D. are cholera, smallpox, measles, scarlet fever, dengue, typhoid and typhus fevers, yellow fever, and diphtheria. Various theories have been propounded regarding the mode of propagation; but it is now generally admitted that all E. D. are communicable, and that each has its own mode of propagation. They are consequently preventable diseases. See *Reports of the Medical Officer of the Privy Council*, *Transactions of the London Epidemiological Society*, and separate articles on the various diseases.

Epidemic Mental Diseases. Popular excitements, so denominated, have nothing in common with epidemic diseases, except in so far as numbers of people are similarly affected at about the same time. Public enthusiasm is never allowed to lie long dormant, and one excitement follows another in rapid succession; but although the weaker class of mind is more liable to be affected, and may be completely upset, this does not constitute a disease. In epidemic diseases the specific poison results in the same specific disease, and in no other; whereas in so-called E. M. D. the result lacks this uniformity. Particular crimes, and modes of crime, frequently prevail; but disease is not necessary to explain the phenomena. There is, however, some influence, apart altogether from human communication, by which numbers of people may be affected simultaneously, and which may be called E. M. D. This is best seen in large communities of the insane, where similar delusions and propensities simultaneously affect numbers of the patients who have had no communication with each other. The best-known E. M. D. are St Vitus's dance, wolf-madness, demonomania, incendiarism, suicide, and panic. See the *Psychological Journal*, and the works of Calmiel and Hecker.

Epider'mis (Gr. *epi*, 'upon,' *derma*, 'the skin'), or **Ec'teron** (the 'outer,' *i.e.*, skin), the name given to the outer and upper layer of the skin in higher animals. The E. in man is composed of layers of flat or squamous *epithelial cells*, the deeper cells being elongated, and having their long axes arranged vertically to the skin-surface, whilst the more superficial cells are of flattened shape and lie lengthwise. The deepest layer of the E. is named the *rete mucosum*, and it is in this latter layer that pigment or colouring matter is deposited. The growth of the E. is effected from below, new layers of cells being produced to take the place of those that are gradually lost or worn away by friction, ablution, &c. The deeper cells become more or less scaly and horny as they approach the surface, and lose the more typical character of the deeper cells. The thickness of the E. varies greatly in different regions of the body. Thus on the soles of the feet and palms of the hands the E. is very thick and horny. In such situations, the thickness of the E. prevents evaporation from the true skin or *dermis* beneath; a proof of this being afforded by exposing two dead hands or feet to the atmosphere, the E. being denuded from one of the members. In the latter case the skin becomes dry and hard, whilst in the foot or hand which has its E. still perfect the natural moisture is retained. The E. is frequently named the *cuticle*. It is not sensitive, possessing no blood-vessels or nerves. In lower vertebrates, such as serpents, &c., the E. is periodically exuviated or cast off. In *plants*, the name E. is given to the delicate cellular tissue or *parenchyma* which forms the outer covering of leaves and of other parts of plants. The E. of plants is made up of flattened cells, often provided with hairs. The lower E. of leaves is perforated by numerous openings or *stomata*, the respiratory or breathing apertures of the leaves. Occasionally the E. of plants becomes hardened by the deposit of woody matter in the walls of the cells of which this membrane is composed.

Ep'idote, a mineral forming monoclinic crystals, with a varying green, brown, or grey colour, hardness between felspar and quartz, and specific gravity about 3·5. E. proper consists of a combination of silica, alumina, iron oxide, and lime; but by substitution of magnesia, lime, &c., for proportions of the iron, several varieties are formed. It has no economic application. The name was derived by Haüy from the Gr. *epididōmi*, 'I increase,' in allusion to the fact that the base of the primary is often much enlarged in the crystals.

Epigen'esis (Gr. *epi*, 'upon,' and *genesis*, 'a beginning' or 'new formation'), a name given in physiology to a theory which held that all new substances in living beings, and even living organisms themselves, were formed of or upon previously existent parts or substances, new organisms being formed by a modification of the old.

Epiglott'is (Gr. *epi*, 'upon,' and *glōttis*, 'the mouth of the windpipe'), a cartilage of an ovate shape, covered by mucous membrane, placed in front of the superior opening of the larynx, and immediately behind the base of the tongue. See LARYNX.

Epig'oni (Gr. *Epigonoi*, 'the afterborn'), the term used in mythic story to denote the sons of the seven heroes—Adrastus, Polynices, Tydeus, Capaneus, Parthenopæus, Amphiaraus, and

Hippomedon—who, with the exception of the first named, perished in the war against Thebes. To avenge the death of their fathers, the E., ten years thereafter, under the leadership of Alcmæon, who had collected a band of Argives, marched against Thebes. The Thebans, under Laodamas, were routed near Glissas in Bœotia, while Ægialeus, on the side of the E., was slain. Thebes was at last taken by the E., and levelled with the ground. The common list of the E. contains Ægialeus, Alcmæon, Diomedes, Euryalus, Promachus, Sthenelus, and Thersander. The war of the E. was the subject of many epic and tragic poems, not one of which has survived.

Ep'igram (Gr. *epi*, 'upon,' and *gramma*, 'a writing'), literally an inscription. The Greek E. was a short poem, mostly in elegiac verse, containing a statement of a single event or thought. Simplicity, rarely point, is its characteristic. The Greek anthology contains about 4500 epigrams by about 300 authors. Among the Romans the E. often took a satirical character. Of the many Latin epigrammatists whose names have been preserved, Catullus and Martial are incomparably the best. The latter wrote about 1500 epigrams, and might be styled an epigrammatist by profession. The modern E. generally ranges from two to eight lines in length, and contains a witty or ingenious turn of thought pointedly expressed. Pope, Swift, Burns, Byron, Moore, and many other English writers, have evinced great epigrammatic talent, but among the moderns the French in E. stand pre-eminent.

Ep'igraph (Gr. *epi*, 'upon,' and *graphō*, 'I write') is the name given to an inscription on a public building or other architectural structure, telling its object, use, or period of construction. In literature it is applied to a quotation or sentence placed as a motto at the beginning of a book, part, or chapter.

Epilep'sy (Gr. *epi*, 'upon,' *lambanō*, 'I seize,' future *lēpsomai*), popularly termed 'falling sickness,' is a complex nervous disease characterised by a sudden and complete loss of consciousness, associated with convulsions, which impede the respiratory process. The epileptic state may vary from simple vertigo, momentary loss of consciousness, and a totter of step, to the most severe convulsive paroxysms. E. was known by the ancients, and was made the foundation of the doctrine of demoniacal possession in the Jewish, Grecian, and Roman philosophy. The attack is sometimes preceded by a premonitory symptom called *aura epileptica*, in which the patient has the sensation of a fluid creeping from the fingers or toes upwards towards the trunk, or as though a spider or insect were crawling over the skin. Some have slight vertigo or headache, swelling of the veins, or throbbing of the arteries of the head, and others have illusions of one or other of the special senses. In general there is immediate loss of consciousness; the patient utters a loud cry, falls down in convulsions, which may be trifling and transient, or terrific and long-continued struggles. Each patient generally falls in a definite position, and injures by the fall one part of the body, as the nose, or side of the head; and some invariably protrude the tongue, which may be bitten through, or much injured by the spasmodic clenching of the teeth. Death may take place during the fit; but the great danger is from the position occcupied when the fit comes on: thus the patient may fall from a height, or into the fire, or water, or on some sharp-cutting instrument, or the fit may come on during the act of swallowing and cause suffocation. Attacks of E. vary in frequency of occurrence, and there is often a very definite periodicity. In severe cases the attacks may be daily, or several times daily; but, in other instances, considerable intervals may elapse. In asylum practice the experienced physician can frequently prognosticate, from slight appearances, that an attack is impending. E. is common among congenital idiots, and is of frequent occurrence among the insane, as a cause or a coincident, and the two diseases are intimately associated. E. is a hereditary disease. It may pass from parent to child, or it may skip over a generation or two. The originating causes of E. are but imperfectly known, although physiologists have of late years made great advances in the study of its etiology. *Post-mortem* examinations throw but little light on the disease. The seat of E. is most probably in the brain, the medulla oblongata, or upper portion of the spinal cord. In most epileptics there is probably a hereditary or a latent tendency, and in some the disease may originate *de novo* from causes which are usually called exciting. In the former class of cases, apparently slight causes, such as functional derangements, interruptions in the circulation which may cause congestion of the brain, may give rise to an attack. In females menstrual derangement is frequently associated with a seizure. The proper treatment during the fit is to place the patient flat on his back, with the head and shoulders a little elevated. The neck-tie and tight-fitting clothes should be loosened, and he should be exposed to a free current of air. Beyond preventing self-injury, no effort should be made to restrain the convulsive movements, nor to rouse by cold water and stimuli. Epileptics should make their health a constant study, as the slightest derangement or excess of any kind may bring on a seizure. They should never expose themselves in any dangerous position. Hygienic treatment is of more avail than any of the specifics that have been recommended, such as nitrate of silver, iodide and bromide of potassium, valerian, zinc, &c. The disease is not curable by any known specifics, nor is it often cured spontaneously. When associated with organic disease of the brain it is incurable; but in very many cases the frequency of the attacks and their severity may be lessened, or they may altogether disappear, by very careful attention to the laws of health, and the avoidance of excesses of every kind. E. must not be confounded with Fainting, Apoplexy, Hysteria, Catalepsy, Eclampsia, or Infantile and Puerperal Convulsions (q. v.). See *Lectures on the Physiology and Pathology of the Central Nervous System*, by Dr Brown-Séquard (Lond.), and *Epilepsy and Epileptiform Seizures*, by Dr Sieveking (Lond.).

Epilo'bium, or **'Willow Herb,'** a genus of Exogenous plants belonging to the order *Onagraceæ*. These plants have four sepals and four petals, a four-sided seed-capsule, and seeds provided with hairs at one extremity. The long pod-like ovary is adherent to the tube of the calyx, the petals and stamens being epigynous. Species of E. are found both in temperate and cold climates. The British species occur in damp situations. *E. angustifolium* (known as 'French willow') has dissimilar petals and rose-coloured flowers. It is common in shrubberies. The pith of E. is used in Kamchatka for making a kind of ale and vinegar.

Ep'ilogue (Gr. *epi* 'after,' and *logos* 'a speech'), in oratory, means the peroration or summing up of a discourse. In theatrical language, it is a short speech in prose or verse at the end of a play. The E. was much in vogue in former times, especially in the case of comedies; and was apologetic, conciliatory, or even rollicking in tone, its object being to acknowledge the indulgence, win the sympathies, and excite the good humour of the audience.

Epimen'ides, a poet and prophet born at Phæstus in Crete. While yet a boy, being sent for a sheep by his father, he entered a cave, and fell into a sleep which lasted fifty-seven years. On awaking he was astonished to find all around him changed. The Greeks looked on him as a favourite of the gods; and the Athenians, whom he delivered in 596 B.C. from the plague that followed Cylon's sacrilege, greatly honoured him. He is said to have attained a very old age, one legend assigning him a lifetime of 299 years. When or where he died is uncertain. By some E. was reckoned—instead of Periander—one of the seven sages of Greece, but he seems rather to have belonged to the class of Orphic bards. Besides other works, two epics—one on Jason and the Argonauts, the other on Minos and Rhadamanthus—are said to have been written by him. E. is supposed to be the prophet alluded to by St Paul in his Epistle to Titus (i. 12). See Heinrich's *E. aus Creta* (8vo, Leips. 1801).

E'pinal (Eng. 'Thornton;' Fr. *épine*, Lat. *spina*, 'a thorn'), the capital of the department of the Vosges, France, on the left bank of the Moselle, beautifully situated at the foot of the Vosges, 35 miles S.S.E. of Nancy by railway. It lies in a valley, 1120 feet above the sea, and has fine promenades, quays, fountains, public baths, the ruins of an old castle, a church (St Maurice) of the 10th c., a small university, a public library of 19,000 vols., a hospital, an art gallery, schools for music and drawing, and a theatre. The Moselle is here crossed by an iron suspension-bridge and by several stone bridges. There are manufactures of edge-tools, chemicals, machinery, paper, lace, &c., and a trade in wine, ironwares, linen, and cattle. About 6 miles S.E., on the Moselle, are the famous paper-mills of Archettes. Pop. (1872) 10,738.

Épinay, Louise-Florence-Pétrouille de la Live d', a French authoress, born about 1725. She was the daughter of an officer, Tardieu d'Esclavelles, and in 1735 married her profligate cousin D'Epinay. The union was unhappy, D'Epinay neglecting his wife, of whom Grimm professed himself the lover. Afterwards Madame d'E. formed a warm attachment for J. J. Rousseau, for whom she caused the famous hermitage to be built in the valley of Montmorency, near her country-seat of La Chevrette. Rousseau, however, becoming jealous of Grimm, quarrelled with Madame d'E., and in his *Confessions* assailed her and the *Encyclopédistes*, with whom she was familiar. During her last years Madame d'E. lived in retirement, consorting chiefly with men of letters, and composing memoirs, &c. She died April 17, 1783. Her chief work, *Mémoires et Correspondence de Mme. d'E.* (Par. 1818), is a full, accurate, and vivid picture of 18th c. manners. See Sainte Beuve's *Causeries du Lundi*.

Epipha'nius was born in Palestine about 320 A.D., of Jewish parents. Converted to Christianity at an early age, he went to Egypt, and joined the monks there. He afterwards returned to Palestine, and founded a monastery near his native place (Eleutheropolis). In 367 he was made Archbishop of Constantia (Salamis) in Cyprus, and died in 402. E. was learned in one sense, being acquainted with Hebrew, Syriac, Greek, Latin, and Egyptian, but at the same time extremely ignorant and credulous, not to say dishonest; but was nevertheless pious after his fashion, though extremely bigoted and dogmatic. His chief work is entitled *Panarion*, a discourse against (eighty) heresies. See his Life by Gervasius, 1738; his works were edited by Petavius (2 vols. Par. 1622), and by W. Dindorf (5 vols. Leips. 1859–63). See Lipsius, *Zur Quellenkritik des Epiphanios* (Vienna, 1865).

Epiph'any (Gr. *epiphaneia*, 'the appearance of a deity to aid a worshipper') means in ecclesiastical usage the manifestation of Christ to the Gentiles. It is observed on the 6th January, twelve days after Christmas (hence called Twelfth Night), and now commemorates specially the guiding of the three magi to Bethlehem by the star (hence called also the Festival of the Three Kings), but originally also his nativity or incarnation, and the manifestation of his divinity at his baptism (Theophany), in his first miracle at Cana (Bethphany), and in that of feeding the 5000 men (Phagiphany). Formerly many lights were used at the festival, ostensibly in reference to Christ as the light of the world (John i. 9; Luke i. 78, 79), but in reality adapted by the Church from pagan ceremonies like those of Christmas and St John's Day. See Bingham's *Eccl. Ants.*, and Walcott's *Sacred Archæology* (Lond. 1868).

Epiphe'gus, a genus of *Orobanchaceæ*, the 'broom-rape' order of Exogenous plants, of which *E. Virginiana*, 'the beech-drops' of N. America, is a familiar species. The root of this species is used as an application to cancerous affections, and has hence received the name of 'cancer-root.'

Epiph'ora is a disease of the secreting lachrymal organs, commonly called 'watery eye.' E. must be distinguished from watery eye caused by obstruction in the lachrymal duct, and may be cured by vapour of laudanum or belladonna, or a solution of nitrate of silver, from two to four grains to the ounce.

Epiphy'tes (Gr. *epi*, 'upon,' and *phyton*, 'a plant'), plants which grow in the air attached to the stems and parts of other plants. Tropical orchids are examples, the roots not reaching the soil. They are of green colour, and possess *stomata*. The roots often possess hairs. Species of *Pothos* and *Tillandsia* are typical E. Many common plants, such as mosses and lichens, might, strictly speaking, be named E., but the name is rather given to higher or Phanerogamous plants which appear to select abnormal habitats, and to become somewhat parasitic in their habits. E. generally tend to injure the plants upon which they grow.

Epi'rus (Gr. *ēpeiros*, 'the mainland'), so called in contradistinction to the islands on the coast, was the name given to the north-western division of ancient Greece. It was bounded on the N. by Illyricum, on the E. by Macedonia and Thessaly, on the S. by the Ambracian Gulf, and on the W. by the Ionian Sea. It now forms the southern part of Albania. In ancient times it was sparsely peopled, but contained a great number of tribes, chief of which were the Chaones, Thesproti, Molossi, and Athamanes. The inhabitants were a mixture of Pelasgians, Macedonians, and Illyrians. The country was mountainous, and produced excellent cattle and horses, and the renowned breed of Molossian dogs. The chief rivers are the Achelous, Arachthus, Celydnus, Thyamis, Acheron, Cocytus, and Charadrus. Its most ancient town was Dodona, famous for its oracle of Zeus: others of note were Ambracia, the capital of Pyrrhus, and Nicopolis, founded by Augustus to commemorate the victory of Actium. One of the earliest kings of E. was Pyrrhus or Neoptolemus, son of Achilles, the reputed founder of the Molossian line. In historical times its most famous ruler was Pyrrhus (295–272 B.C.), who harassed Rome for a long period. On the death of Ptolemy, grandson of Pyrrhus, E. became a republic, and remained so till the conquest of Macedonia by the Romans, 168 B.C. The Epirotes being accused of assisting Perseus, King of Macedonia, L. Æmilius Paulus, by order of the Roman Senate, razed seventy of their towns to the ground and sold 150,000 of the inhabitants as slaves. From this blow E. never recovered. It followed the fortunes of the Roman and Byzantine empires till 1204, when a new dynasty, known as the *Despots* of Albania, was founded by a member of the Byzantine family of Comnenus. E. remained under this rule till 1466, when, after twenty years determined resistance under its last *despot*, George Castriot (Skanderbeg), it yielded to the Turks, and was annexed to the Ottoman Empire. See Finlay's *History of the Byzantine Empire*.

Epis'copacy (from the Gr. *episkopos*, 'a bishop') is that form of Church government in which there are several orders of clergy, those of one of the orders (the bishops) superintending the others—the presbyters, deacons, &c. Episcopalians hold E. to be essentially 'the dignity of a bishop,' which is the fulness of the priesthood and is comprehended in the apostolic office, and to be an apostolic and therefore divine institution, existing from the very first organisation of the Church. From the same point of view E. has an indelible character, and possesses a threefold power—of *order* in the ministration of the sacraments, of *interior jurisdiction* in the conscience, and of *exterior jurisdiction* in the Church. Presbyterians, on the other hand, maintaining that E. came into existence as a later hierarchical development, hold the complete parity in respect of office and authority of all the clergy. The Roman Catholic, Greek, Lutheran, and Anglican (including the American and Scotch) are all Episcopal Churches. See BISHOP, and Blunt's *Dict. of Doctr. and Hist. Theology* (Lond. 1872).

Episco'pius, in Dutch **Bisschop, Simon**, a celebrated Arminian divine of the 17th c., was born at Amsterdam, 1st January 1583, studied at Leyden, where he heard both Gomar and Arminius lecture, and at Franeker, where he heard Drusius. Joining the anti-Calvinist party (which was then in a minority), he obtained a church near Rotterdam, and in 1611 was chosen one of the committee of six Arminians sent to meet the Counter-remonstrants before the States-General. In 1612 he was appointed successor to Gomar at Leyden, though the Remonstrant feeling against him was so strong that his brother's house at Amsterdam was sacked. E. not only repudiated 'election,' and taught the universal offer of salvation, but generally depreciated the value of pure dogma, bringing into prominence the ethical and emotional aspects of religion. Even to the doctrine of the Trinity he endeavoured to assign a practical importance. Toleration, which is involved in the idea of human brotherhood, seemed to him a leading duty, and in this he was supported by Grotius and Barneveld, and the Republican party in civil matters generally. When Maurice of Orange, wishing to strengthen Calvinism for political purposes, called the Synod of Dordrecht (1618), E. made a noble but unavailing stand for free speech. He then withdrew to Antwerp and Rouen, but on Maurice's death resumed preaching at Rotterdam, and finally, in 1634, became Rector of the Arminian College at Amsterdam, where he died, 4th April 1643. E. is the great expositor of Arminianism. Among English divines Hammond and Tillotson owe much to him. His most important works are the *Confessio Remonstrantium* (1621), *Apologia pro Confessione* (1629), and the unfinished *Institutiones Theologicæ*. A complete edition of his works was published at Amsterdam in 1650–65.

Ep'isode (Gr. *epi*, 'besides,' and *eisodos*, 'a coming in'), an incidental narrative introduced by writers to give variety to their subject. In epic and didactic poetry the E., if fitly chosen and

skilfully introduced, affords a pleasant relief to the reader. The parting of Hector and Andromache in the Iliad, of Aristæus and his bees in the Georgics, of Dido in the Æneid, of Ariadne in the *Peleus and Thetis* of Catullus, of Francesco da Rimini in Dante's *Inferno*, of Pastorella in Spenser's *Faery Queene*, of Damon and Musidora in Thomson's *Seasons*, of Margaret in Wordsworth's *Excursion*, and Glaucus in Keat's *Endymion*, are familiar examples of the E. in ancient and modern poetry.

Epispas'tics. See COUNTER-IRRITANTS.

Epistax'is, or bleeding from the nose, is very common in children and young people, and usually depends on congestion of the mucous membrane. Cold applications to the forehead and bridge of the nose, with a brisk purgative, generally arrest E. In severe cases it may be necessary to plug the nose with a pledget of lint, or a sponge soaked in some astringent, as muriate of iron. When E. is copious, caused by the rupture of a vessel from violence, it may be necessary to plug both the posterior and anterior nares, but this can only be done by a surgeon.

Epis'tle, in the New Testament, means a letter written by an apostle to an individual or a Church; in the Liturgy, the first lesson in the Communion Service, so called because generally taken from the apostolic epistles (hence the term 'apostle,' also used), though sometimes also from the Acts, and even from the Old Testament prophets. See LESSONS.

Epistle Side of the Altar is the left or S. side, on which the Reader (q. v.) stands to read the Epistle (q. v.) in the Communion Service of the Church.

Ep'itaph (Lat. *epitaphium*, Gr. *epi*, 'upon,' and *taphos*, 'a tomb'), at first the name of a monument above a grave, now signifies an inscription on a tomb. The Greeks placed an inscription only on the tomb of a hero, but the Romans wrote epitaphs (generally beginning *Sta Viator*) on the tombs of their relatives. In England epitaphs in Latin are found written by the Romanised Britons, but the first Latin epitaphs written by Englishmen appear in the 11th c. From the end of the 12th to the middle of the 14th c. epitaphs are mostly in French, after which English is frequently used. Early Christian epitaphs are visible in the catacombs at Rome. Epitaphs form part of the literature of most countries, and large collections of them have been made, containing many fine examples of pathos, wit, and solemn brevity of expression. See Labbe's *Thesaurus Epitaphiorum* (Par. 1666), the *Anthologia Græca*, and Pettigrew's *Chronicles of the Tombs*, in Bohn's Antiquarian Library.

Epithala'mium (Gr. *epithalamion*), properly a song sung in chorus before the bridal chamber (*thalamos*), but now commonly applied to any nuptial song. Among the Greeks, Alcman, Stesichorus, Sappho, Anacreon, Pindar, and others wrote epithalamia, of which only scattered lines remain. The eighteenth idyl of Theocritus, in which twelve Spartan maidens sing the praises of Menelaus and Helen, is the most perfect specimen of the E. proper which we possess. The two nuptial songs of Catullus, and the E. of Peleus and Thetis by the same poet, are exquisite examples, and stand alone in Latin literature. In the *Medea* of Seneca we have the E. of Jason and Creusa, in Statius that of Stella and Violantella, in Claudian that of Honorius and Maria, but these cannot be compared with the hymeneals of Catullus. The E. was a favourite subject with the modern Latin poets. One by George Buchanan on Francis II. and Mary Stuart is remarkable for grandeur of thought and pomp of style. The E. of Spenser is one of the glories of English literature, and may safely be pronounced the paragon of all poems of its kind. Ben Jonson and Herrick, in their epithalamia, are largely indebted to Catullus.

Epithe'lium, a primary tissue of higher animals, composed of cells termed *epithelial* cells. This membrane is formed in the embryo from the *hypoblast*, or innermost of the three layers into which the *blastoderm* or *germinal membrane* divides. It is seen typically as the lining membrane to the digestive system, and as forming the lining of Glands (q. v.) and their ducts. The cells of which E. is composed form a continuous layer. They are *nucleated*, that is, possess central particles or *nuclei*. The outer skin is also formed of epithelial cells (see EPIDERMIS), so that this layer in reality forms both the outer and inner lining of the body. Four chief varieties of E. are found. The commonest, called *squamous*, *pavement*, or *tesselated* E., is seen in the skin, mouth, pharynx, gullet, conjunctiva of the eye, vagina, &c., and is formed of flat, oval, or polygonal nucleated cells, arranged in one or more layers. Such cells are also found in the serous sacs of the body, such as the pleura, &c., and in the blood-vessels. The *spheroidal* epithelial cells have a rounded outline, and E. formed of the latter is found as a lining membrane of glands. Hence it is also known as *glandular* E. The *cylindrical* E. is formed of cylindrical or *columnar* cells. This variety lines the stomach and intestine and the ducts of most glands. It also occurs in the gall-bladder and testicle, &c. Each cylindrical epithelial cell is packed closely amongst its neighbours, and has a flat nucleus with contained *nucleoli*. The last variety of epithelial cells is known as *ciliated* E., these cells being provided on their free extremities with delicate processes named *Cilia* (q. v.), which keep up a constant vibriatile motion, and thus aid in the diffusion and circulation of fluids, &c. These ciliated epithelial cells are found in the windpipe, larynx, Fallopian tubes, spinal cord, &c. The functions of E. are chiefly to protect the surfaces of the body, secrete fluids, and circulate fluid matters by aid of the cilia. E. contains both blood-vessels and lymphatic vessels. Its cells grow by absorption of nutritive matters from the blood, and new growths are continually taking place from beneath, to replace those cells that are worn away above.

Epizo'a (Gr. *epi*, 'upon,' and *zōon*, 'a living creature'), a term applied generally to those animals which exist parasitically on the outer surfaces of others. This classification, like the use of the term Entozoa (q. v.), is founded upon no natural grounds, and is not used with any specific meaning in modern zoology. The chief E. are lice, fleas, bugs, bird-lice, &c., and certain *Acarina* or mites, such as the *Demodex folliculorum*, inhabiting the skin follicles of the human nose, may also be included under this name. The ticks and the itch-mite (*Sarcoptes scabiei*), causing the disease of that name in man, also belong to this group of parasites. The itch-mite, demodex, and their allies actually live within the skin substance; the lice, fleas, and commoner E. living upon the skin surface only.

Epizoöt'ics (from the same root as the foregoing) are diseases of animals, analogous to epidemics in the human species. They extend over vast tracts of country, and seem to be propagated from animal to animal, each disease having its own mode of propagation. Pleuro-pneumonia, foot-and-mouth disease, and vesicular epizootic may be cited as examples. See DISEASES, ACT RESPECTING.

E'poch, in chronology. See CHRONOLOGY.

Epoch, in astronomy, is the time at which a celestial body passes a certain point in its orbit which has been arbitrarily fixed. In a planet this point is usually the perihelion, and this determination of the time of perihelion passage constitutes one of the seven elements of a planet's orbit. For another signification of the same word see HARMONIC MOTION.

Ep'ode (Gr. *epōdos*, 'singing to') was part of a lyric ode sung after the strophe and antistrophe. E. was also a name applied to poems in which each second verse was shorter than the first, or in which one of the verses was made up of two metres of distinct character, as in the *Epodes* of Horace.

Epp'ing, a market-town in the county of Essex, on the northern skirt of Epping Forest, 16 miles N.E. of London, and 4 N. of Loughton station on the Great Eastern Railway. It chiefly consists of a main street, running N. and S., on a slight elevation, and its principal industry is the production for the London market of butter, cream, cheese, &c. Cattle-fairs are held here. Pop. (1871) 2275.—The famous Epping Royal Forest, formerly known as Essex or Waltham Forest, has now dwindled to 60,000 acres, occupying the S.W. portion of the county, between the rivers Lea and Roding. Of its area, however, about 55,000 acres are estimated to be enclosed and private property. The forest lands are under the care of a lord-warden and four verderers. During the summer months the forest is a great resort of pleasure-seekers, especially from the eastern part of the metropolis. See *Epping Forest* (Lond. 1878).

Éprouvette' (Fr. from *éprouver*, 'to try'), an instrument for determining the projectile force of gunpowder. The ordinary E. takes the form of a pistol with a small strong barrel, and the

propulsive force of the powder is estimated by the action that a given quantity of it on being fired exerts upon a spring or heavy weight. In British Government factories, large and fine grain gunpowder is tested with the 8-inch mortar elevated to an angle of 45°, in which are placed 2 oz. of powder and a cast-iron shot weighing 68 lbs. Three firings take place, and the mean distance of the three ranges of the shot determines the strength of the powder. The test is found in practice to be fallacious, and the adoption of a more reliable system of proving powder is under consideration.

Ep'som (anc. *Thermæ Ebbisham*, 'the warm springs of Ebba,' an early English queen and saint), an old market-town of Surrey, on the edge of Banstead Downs, 14 miles S.S.W. of London by the South-Western Railway. It has an elegant church, the tower of which contains a peal of eight bells, extensive nursery grounds, and some malting, brewing, brickmaking, &c., but is chiefly celebrated on account of the great racecourse in the vicinity, where races take place in April, September, and the week before Whitsuntide. (See DERBY-DAY.) E. Salts (q. v.) were originally made here at the sulphate of magnesia springs. Near E. is the Royal Medical Benevolent College (founded 1854), for the maintenance of decayed members of the profession and widows, and for the education of 170 of their boys. Pop. (1871) 6276.

Epsom Salts is the common name of sulphate of magnesia, and is so called on account of its occurring in the water of a spring at Epsom. It is found also in many other mineral springs and in sea-water, and is sometimes separated from the latter by fractional crystallisation. It may also be prepared either from magnesite (native carbonate of magnesia), or from dolomite (carbonate of magnesia and lime). From the former of these two it is obtained by the direct action of sulphuric acid; from the latter by first calcining the mineral and then acting upon it with sulphuric acid. The solution of sulphate of magnesia resulting in either case is crystallised by evaporation. E. S. is a colourless crystalline substance, having a bitter and nauseous taste. Its chemical formula is $MgSO_4,7H_2O$. When heated to 100° C., it loses six of its seven molecules of water. The remaining molecule can only be expelled at a much higher temperature. E. S. is used in medicine as a purgative in doses of from ½ to 1½ oz.

Ep'worth, a market-town and parish in Lincolnshire, 23 miles N.N.W. of Lincoln. The principal industries are flax and hemp dressing, and cattle, flax, and hemp are sold at the two annual fairs. John Wesley was born at E., 17th June 1703. Pop. of parish (1871) 2295.

Eq'uable Mo'tion, known more commonly as uniform velocity. See VELOCITY.

Equal'ity. See LIBERTY, EQUALITY, AND FRATERNITY.

E'qual Tem'perament, in music, the system of tuning by which the octave is divided into twelve equal semitones, as in the pianoforte, &c. See JUST INTONATION and TEMPERAMENT.

Equa'tion, in pure mathematics, is an assertion of equality between two expressions, and is represented to the eye by the symbol $=$. Thus $A = B$ is an assertion of equality, and is therefore an E. Now such an assertion may be always true, whatever the values of the quantities involved may be; as, for instance, $a = a$, $(a + b)^2 = a^2 + 2ab + b^2$, &c. These are called equations of identity, or simply Identities (q. v.). But if we assert that $a + 3 = 5$, then we have an E. of condition, which is satisfied by only one value of a, 2 namely. It is this latter class which is more particularly studied here. Into all such equations quantities of two distinct kinds enter—the *knowns* and the *unknowns*. In the E. above, 3 and 5 are of course known, while a is unknown, but may be at once given in terms of the others. This determination of the unknown is the solving of the E., and any definite value, expressed in terms of the known quantities, which when substituted for the unknown quantity satisfies the E. (*i.e.*, reduces it to an identity), is called a *root* of the E. Thus the E. $x^2 = 5x - 6$ has two roots, namely, 2 and 3. To obtain a clearer notion of what a root is, consider the general E. of the nth order, $x^n + A_1 x^{n-1} + A_2 x^{n-2} + \ldots + A_r x^{n-r} + \ldots + A_{n-1} x + A^n = 0$, where A_1, A_2, &c., are known quantities, and x the unknown. It is easily shown that this expression may be thrown into the form $(x - a_1)(x - a_2)(x - a_3) \ldots \ldots (x - a_n) = 0$, where a_1, a_2, a_3, &c., are definite functions of the coefficients A_1, A_2, A_3, &c., and may be rational or of the impossible form $\alpha + \beta\sqrt{-1}$. (See IMAGINARY QUANTITIES.) Now if for x any one of these a's be substituted, the left hand is reduced to zero, and the E. rendered an identity. Therefore each a is a root, and hence there are n roots. Accordingly the number of roots of an E. of one unknown corresponds to its order, *i.e.*, to the highest power of the unknown quantity which enters. The investigation of general expressions like the above constitutes the *theory of equations*, an extremely important branch of algebra. An E. containing more than one unknown quantity, such as $a_1 x + b_1 y + c_1 z = p_1$, where x, y, and z are the unknowns, cannot be solved in a determinate manner. To render a solution possible, there must be as many equations as there are unknown quantities, so that in this case we must have for the complete determination of x, y, z, two other equations, $a_2 x + b_2 y + c_2 z = p_2$, $a_3 x + b_3 y + c_3 z = p_3$. From these any two of the unknowns may be eliminated, and the remaining one expressed in terms of the coefficients. When algebra was first brought into Europe by the Arabs, who obtained it from the Hindus, equations of the second degree had been solved. The Italians added, imperfectly, the solutions of the third and fourth, and these have in more recent times been completely solved. The general E. of the fifth was then tried, but unsuccessfully, and Abel has proved that it is impossible to obtain an expression depending on the coefficients which may have five values, and which satisfies the E. Here we cannot enter into the methods devised by Newton, Fourier, Sturm, Horner, &c., for approximating to numerical roots of equations, but must refer to the many treatises on the subject by Lagrange, De Fourcy, Murphy, Young, Hymers, Peacock, Todhunter, &c.

Equation, Annual.—See LUNAR THEORY.

Equation, Differential.—See DIFFERENTIAL EQUATIONS.

Equation, Functional.—See FUNCTIONS.

Equation, Lunar.—The numerical expression for a perturbation of the moon. See LUNAR THEORY.

Equation of Equinoxes is the difference between the true position of the Equinoxes (q. v.) and the position calculated upon the supposition that their Precession (q. v.) is uniform.

Equation of Light, in astronomy, is the allowance which must be made for the time which the light emitted by a celestial body takes to traverse the space separating that body from the earth, and is one of the corrections which must be applied to the observed position in order to obtain the true position of a given star.

Equation of Payments, a rule in arithmetic for ascertaining the time at which a whole debt, due in different parts payable at different times, should be paid so as to be attended with loss to neither party. The rule is now of little practical use, sums of money due at a future time being generally secured by bills of exchange or promissory notes. If the time of payment is altered, it is usually with a view to immediate payment. See DISCOUNT.

Equation of the Centre is the difference between the true observed longitude of the earth and its mean longitude as calculated upon the supposition that the earth moves uniformly in a circle round the sun. This difference, owing to the small eccentricity of the orbit, never exceeds 1° 55′ 33″·3.

Equation of Time is the difference, measured in mean solar time, between the true time as given by a sun-dial and the mean time as indicated by a well-regulated clock. It arises mainly from the varying velocity of the earth in its orbit, and the eccentricity of that orbit, from which causes the true or observed right ascension of the sun must obviously differ from its mean right ascension, or the right ascension which it would have if the earth moved uniformly in a circular orbit round it during the course of a year. The obliquity of the ecliptic also influences this equation to an appreciable extent, and the moon and planets must likewise have a perturbing effect. See DIAL.

Equations, Chemical. These represent by means of symbols and formulæ chemical reactions. Thus $2H_2 + O_2 = 2H_2O$ represents the reaction which takes place when hydrogen and oxygen combine to form water. See CHEMISTRY.

Equator, Celestial or **Equinoctial,** is the great circle of the celestial sphere whose plane is perpendicular to the earth's axis of rotation, and the **Terrestrial E.** is the corresponding great circle on the earth's circumference, dividing it into two equal hemispheres, the northern and southern.

Equato'rial is the technical name of a telescope so mounted as to be capable of rotatory motion round two axes at right angles to each other, the one axis always pointing in a direction parallel to the earth's polar axis. Accordingly, if a star is in the field of view, it can be kept so by subjecting the telescope to one motion, viz., that round the *polar* axis, which motion, to ensure uniformity, is usually imparted to it by clockwork. The E. is of great importance in all observatories.

Eques'trianism. See HORSEMANSHIP.

Eques'trian Order (Lat. *ordo equestris*), or **Eq'uites.** The term *equites* was originally used to denote, not an order in the Roman state, but the cavalry of the army. According to the Roman legend, the number levied by Romulus was 300. Each century bore the name of one of the three tribes—*Ramnes, Tities, Luceres.* Servius Tullius increased the E. to 3600, divided into eighteen centuries, the twelve new ones being formed alike of patricians and plebeians who had the necessary property qualification. Each *eques* received 10,000 *asses* (pounds of copper) to buy a horse, and 2000 *asses* annually to maintain it, and had to serve ten years. In B.C. 403, in consequence of the reverses before Veii, a number of people possessed of the requisite fortune voluntarily served without receiving a horse or a horse's allowance. These were styled *E. equis privatis*, and were not admitted into the eighteen *Centuriæ Equitum*, whose dignity was hereditary. As Rome increased in prosperity, a wealthy middle class arose, and in 122 B.C. the right of acting as jurors on criminal trials was transferred from the senators to those possessed of the *census equester, i.e.*, 400,000 sesterces. This new body was called the E. O., and all necessary connection between the E. and military service now ceased. For a time the senatorial order wrangled with the E. O., and in 70 B.C. Sulla deprived the latter of the *judicia.* The two orders were reconciled by Cicero during Catiline's conspiracy, but at last the E. O. joined Cæsar and the popular party. Under the Empire the indiscriminate admission of all who possessed the required fortune brought the order into contempt, and the *E. equis publicis*, having long ceased to be the regular cavalry, did little more than furnish cadets for military posts. The insignia of the E. and E. O. were the gold ring (*annulus aureus*) and the tunic with the narrow vertical stripe of purple (*tunica angusticlavia*). By the *Lex Roscia* (B.C. 67) the fourteen rows of seats in the theatre immediately behind those occupied by the senators were assigned to the E. O.

Equian'gular (Lat. 'having equal angles'), the name given to geometric rectilinear figures all of whose angles are equal one to another. Figures are also said to be E. to each other when their corresponding angles are equal.

Eq'uidæ, a family of Ungulate or 'hoofed' quadrupeds, sometimes also named *Solidungula*, and represented by the horses, asses, zebras, &c. This group of mammals belongs to the Perissodactyle ('odd-toed') group of *Ungulata*, as only one toe—the third—in each foot is fully developed. Thus the horse walks upon this single developed toe, which is provided with a broad nail termed a 'hoof.' The teeth form an interrupted series in each jaw. There are six incisors, two canines, six præmolars, and six molars in each jaw. The males alone possess canines, which are small. The skin is hairy, and a 'mane' exists. The E. are confined in present distribution to Europe, Asia, and Africa, although they have been imported into America. Fossil E. abound in later Tertiary deposits in Europe, Asia, and America.

Equilat'eral (Lat. 'having equal sides'), in geometry, is the name given to polygons whose sides are all equal one to another. The *E. hyperbola* has its conjugate diameters equal, bearing the same relation to the common Hyperbola (q. v.) which the circle does to the Ellipse (q. v.).

Equilib'rium (Lat. 'equal balance'), a state of rest produced by forces mutually balancing. When a material system, unrestrained by friction, is in E., the rate at which the applied forces act at the instant of passing through it is equal to the rate at which potential energy is gained. If the system is capable of being balanced in any position, its E. is said to be neutral, as is the case with a perfect homogeneous sphere placed on a plane horizontal surface; if, upon a slight displacement from its position, it returns and continues vibrating about this position, never increasing its distance from it, its E. is then said to be stable, as in the case of the same sphere placed at the bottom of a concave surface; but if the system can be displaced in any way so that its vibrations will not take place within definite limits as before, but will have the effect of making the system move farther and farther away from its original position, the E. is unstable, as, for example, an egg set upon one end, or a sphere set on the highest point of a convex surface. The mathematical conditions for these three kinds of E., in which a system may be, are as follows:—The E. is neutral when the potential energy is constant for all positions; stable when it is a minimum for that position with regard to every displacement; and unstable when it is a maximum for one, more, or all displacements. See ENERGY and STATICS.

Equin'ia. See GLANDERS.

Equinoc'tial. See ECLIPTIC, EQUATOR, EQUINOXES.

Eq'uinoxes (Lat. 'the equality of night,' *i.e.*, with day), in astronomy, are the times at which the sun in its apparently annual motion round the ecliptic passes through the equator at the so-called equinoctial points, which are sometimes also called the E. At these times day and night are equal for all parts of the globe. The *vernal* equinox occurs about March 21, and the *autumnal* about September 22. The interval of time between the vernal and autumnal E. is longer by nearly eight days than that between the autumnal and vernal, on account of the slower motion of the earth during the former period, when the sun appears in the northern hemisphere. See ECLIPTIC.

Equip'ment, Eq'uipage (Fr. from *équiper*, 'to furnish;' Old Fr. *esquiper*, 'to equip a ship;' Span. and Port. *esquife*, 'boat;' Old Ger. *skif;* Icel. *skip, scip*, 'a ship'), the furnishing of a ship with all technical appliances. Camp E. embraces all the technical appliances of a camp—as tents, kitchen furniture, saddle-horses, baggage waggons, &c. The E. of a soldier includes his dress, arms, accoutrements, ammunition, and provisions for a day or other fixed term.

Equipoll'ent is a term sometimes used in Scotch law to signify *equivalent*, or similarity of effect. Where a particular form is prescribed by a statute or by agreement, an E., that is, an act tantamount in effect, will not be held legal compliance with the prescribed form.

Equise'tum, a well-known genus of Cryptogams, or lower and flowerless plants, belonging to and forming the type of a natural order, *Equisetaceæ.* They are familiarly named 'horse-tails,' and a common example of the group is the *E. arvense*, or field horse-tail, which grows from a creeping root-stock with erect stems of both fertile and barren nature. The fertile stems are not branched, and attain a height of from 6 to 10 inches. They wither in spring, before the growth of the barren stems. Each fertile stem is topped by a little cone consisting of scales, bearing the spore-cases or sporangia on their under surfaces. The spores of E. exhibit hygrometric movements. They are provided with long processes, which coil up when moistened, but expand when dry. The barren stems in summer give off slender-jointed branches in verticils or whorls. A familiar species of E. is the *E. hyemale* or Dutch rush, the outer skin or Epidermis (q. v.) of which contains so much silica or flint, that it is used for polishing pewter pots and metallic substances. The species of E. grow very rapidly, and sometimes annoy the agriculturist. Cattle appear to be injured by them, and they possess astringent and diuretic properties.

Eq'uity and Law. It is a common error to suppose that equity is administered at the discretion of the judge, according to the circumstances of each case, without regard to rule or precedents. What equity does is to do justice between parties where there is no legal obstacle. If the doing of justice will controvert a statute or established rule of common law, then equity has no power. Thus the law being that marriage revokes a will previously made, equity could not set aside this rule, however unjust might be the operation of it in an individual case. Here

the law—presumably just in its general operation—must for the sake of the general good inflict an occasional hardship. It is considered expedient for public good in England that a man should be able to dispose of his estate as he chooses. This being so, suppose he makes a very unjust distribution of his property, equity cannot interfere, because were equity to interfere, the general harm done would outweigh the individual good. Plainly, every one who thought he had reasonable ground for discontent with a will would ask for the interference of the court, and the court would come virtually to be the general will-maker. But where there is no legal bar to equity, then equity will prevail. In Scotland, the Court of Session, as the supreme civil court of the country, combines in itself the functions of law and equity. The equitable power is called the *nobile officium* of the court, a term of Roman law. The *nobile officium*, or *judicium nobile*, of the Roman law was a limited power given to the prætor of legislative control over the law. While this power is not given to any court in England or in Scotland, many of the decisions of the supreme tribunals are necessarily legislation, from the fact that cases arise which there is no statute or ascertained rule of common law to meet. In deciding such cases, the claims of pure law and equity are adjusted on the considerations stated above; justice can be done in the individual case only so far as is consistent with laying down a rule of law which is the best rule for the public. Hence it frequently happens that the party in an appeal case who is found liable in costs is really paying for public legislation.

Eq'uity, Courts of, in England. These are the Lord Chancellor's court, the Master of the Rolls' court, and the courts of the three Vice-Chancellors. Each of these judges presides over a separate tribunal, and any causes or motions may be brought before them, except those relating to lunatics, which are always heard by the Chancellor. A Vice-Chancellor is bound to hear all those matters which the Chancellor may direct, in addition to those originally set down for hearing in his own court. The Master of the Rolls is not so bound. While this volume has been in press, an important change has been effected in the constitution of the supreme law-courts of England by the passing of the Supreme Court of Judicature Act (1875). The Court of Chancery, of which the above constitute the divisions, is transmuted into a division of 'Her Majesty's High Court of Justice.' It may for some time hold by the tradition of a distinct form of procedure, but ultimately the result will probably be uniformity of action. The essential difference between the courts of law and the courts of equity, as these have hitherto existed in England, consisted principally in the subjects of their jurisdiction, in the nature of the remedy provided, and in their methods of procedure. The most important form of relief given by the courts of equity is that of Injunction (q. v.), which may be to restrain the adverse party in a suit from any act in violation of the plaintiff's right, or to restrain a person from proceeding with an action where it is strictly of a civil nature, or from enforcing judgment. Equity courts will interfere to prevent waste, infringement of copyright, negotiation of bills, and imitation of trade marks. See COURT OF JUDICATURE, SUPREME, ACTS.

Equity of Redemption. Although by the law of England a mortgage is forfeited on non-payment of the sum borrowed at the time agreed on, equity will interfere to prevent the sale; and if the value of the mortgage is greater than the sum advanced, equity will allow the mortgagor within a reasonable time to redeem his estate, paying to the mortgagee his principal, interest, and expenses. The advantage thus allowed to the mortgagor is called the E. of R. But the mortgagee may call on the mortgagor to redeem his estate, and if he fail to do so, the mortgagee may foreclose, by which the E. of R. is lost. See MORTGAGE, EJECTMENT.

Equiv'alent, Joule's, is the quantity of mechanical work required to be expended so as to raise unit mass of water at a given temperature by one degree. It will be sufficient here to give the final conclusions published by Joule, reserving to the article THERMO-DYNAMICS the history of the subject. In 1849, after six years' experiment, he thus gives his results:—'1st, The quantity of heat produced by the friction of bodies, whether solid or liquid, is always proportional to the quantity of work expended;' and '2d, The quantity of heat capable of increasing the temperature of a pound of water (weighed *in vacuo*, and taken at between 55° and 60°) by 1° F. requires for its evolution the expenditure of a mechanical force represented by the fall of 772 lbs. through the space of one foot.' The value of gravity is that of Manchester, where the experiments were made.

Equiv'alents, Chemical. By the equivalents of substances are understood the proportions in which they combine or replace one another, these proportions being referred to a common standard, viz., 1 part by weight of hydrogen. Thus 56 is the equivalent of caustic potash, and 49 that of sulphuric acid, and therefore these quantities of the two substances unite, neither being in excess. 32·5 is the equivalent of zinc, and this quantity of zinc can replace 1 part by weight of hydrogen in 49 parts by weight of sulphuric acid, giving 80·5 parts by weight of sulphate of zinc. The term *equivalent* is now not often employed, the facts of equivalence being more readily explained by the Atomic Theory (q. v.).

E'ra. See CHRONOLOGY.

Erasis'tratus, a Greek physician and anatomist, was a native of the island of Ceos, and lived in the 3d c. B.C. After residing for some time at the court of Seleucus Nicator in Syria, he established himself as a teacher and practitioner in Alexandria, where he founded a school of medicine. The date and even the place of his death are uncertain, and only a few fragments of his numerous writings survive. The interest attaching to his name is that he narrowly escaped anticipating Harvey's discovery of the circulation of the blood. See Hieronymus, *Dissertatio Inauguralis exhibens Erasistrati Erasistraticorumque Historiam* (Jena, 1790).

Eras'mus, Deside'rius, the Greek and Latin equivalents of the Dutch **Gheræerd** ('The Beloved'), born at Rotterdam, 27th October 1467, was the son of Gheræerd of Tergouw and Margaret of Zevenbergen, the sweet though painful story of whose lives has been told in Charles Reade's *Cloister and Hearth*. He was educated at Groot's school, kept by the Brothers of the Common Life at Deventer, and at Bolduc in Brabant, and then entered the Augustine monastery at Steyn. Before this both his parents had died. At Steyn he diligently read Latin authors with Wilhelm Hermann, and wrote his classical essay *De Contemtu Mortis*. But poetry was next to heresy in the eyes of the monks, whose drunken habits disgusted E. He was therefore glad in 1491 to be employed as the secretary of Henri à Bergis, Bishop of Cambray. From Cambray he went to the wretched Scotist College of Montaigu, of which the rector was the ascetic John Sandouck, and soon obtained a good deal of tutorial work at Paris University (Englishmen, such as Blunt and Grey, being among his pupils), where he remained till 1498, when he came to England for eighteen months. At Oxford, where Charnoch, Prior of Augustinian Canons Regular, was head of St Mary's College, he met Thomas Linacre, the grammarian, afterwards physician to Henry VIII., William Grocyn, the patriarch of Greek learning in England, Thomas Latimer, and Thomas More; but E.'s chief friend was John Colet, the liberal theologian, with whom he had many a friendly *disputatiuncula*. The next six years he spent in Paris, Orleans, and the Netherlands. To this period belongs the *Enchiridion*, or 'Christian Soldier's Dagger,' a Platonic summary of human nature and its religious duties, with very little reference to Catholic dogma, which was, however, approved by Pope Adrian VI., then Principal of Louvain, though subsequently condemned as heretical by the Sorbonne. It was translated into all the Western languages: into English by Tyndale. About this time (1503) began E.'s acquaintance with the spiritual-minded Franciscan, John Vitrarius of St Omer. In 1506 we find him again in England, where he saw his old friends at Oxford, and became Bachelor of Divinity at Cambridge. The same year he went to Italy, and got his doctor's degree at Turin. After a visit to Bombasius at Bologna, he went to Venice to arrange with the printer Manutius about a work on the *Wages of the Ancients*, and also about editions of Terence and Plautus, and some translations from Euripides. At Padua he met Musurus, and in 1509, after spending some time in Rome, he returned by Como, Chur, Strasburg, and Antwerp to England. Here he composed his famous *Encomium Moriæ* ('Praise of Folly'), which rivals Lucian in satire, and excels him in good humour. It was afterwards illustrated by Holbein. E. now lectured at Cambridge on Greek, and became

Lady Margaret's Professor of Divinity. In 1514 he went to see the printer Froben (successor of Amerbach) at Basel, and on his way thither met Sebastian Brandt (author of the *Narrenschiff*), Bilibald Pirckheimer, the learned senator of Nürnberg, and John Reuchlin, the bold student of the Cabbala, then engaged in his strife with the inquisitor Hochstraten, who desired to burn all the Jewish literature. E. was appointed councillor to the young Archduke Charles of Burgundy, who afterwards wished to make him a bishop in Sicily. In 1516 Froben published the first edition of E.'s Greek Testament, dedicated to Leo X. A good deal of sarcasm appears in the annotations, and also several odd blunders, such as putting *Neapolis* in Caria. Among other savage criticisms was that of Edward Lee, afterwards English Primate, who maintained the text of the three witnesses, which E., anticipating the labours of the Revision Committee (1876), had omitted. In this field E. was first, Laurentius Valla had only collated the MSS., and the *Complutensian Polyglott* of Cardinal Ximenes did not appear for some years after. The Testament was followed by the edition of St Jerome, for whom E. had a deep admiration. After a stay at Brussels, where he had an angry correspondence with the German Budæus, he went to Louvain, superintending the administration of the Busleiden bequest. Here he met Von Hutten, who had just published one of the best of the *Epistolæ Obscurorum Virorum*, and received his first letter from Luther. He left Louvain in 1521 and proceeded to Basel, whence he wrote his letter of advice to the new Pope (Adrian III.), and where he quarrelled rather shabbily with Von Hutten, who wrote thereupon his *Expostulation*. This elicited E.'s *Sponge*, in which he tries to excuse himself from not actively taking part in the Reformation. E. also retaliates on Von Hutten in one of the *Colloquia*, a lively and interesting book which must be read, and cannot be described. The next pope, Clement VII. (1524), gave E. a pension of 200 florins, but the *Colloquies* were soon after condemned by the Sorbonne; and E. had to write his defiance to 'certain most impudent jackdaws.' He died at Basel, 12th July 1536. E. was not a hero. Although amiable, industrious, and truthful, as well as learned and ingenious, he had some mean qualities. His supremacy was purely intellectual, and he believed that criticism would gradually remove the corruptions of Rome. He is, in some sense, the forerunner of the modern Broad Church party. It is a great tribute to his literary eminence that his works are still read and admired. Twenty-seven editions of the *Encomium Moriæ* appeared in E.'s lifetime; the latest English version, by Copner, was published in 1878. See Life by R. B. Drummond (2 vols. 1873).

Eras'tus, Thomas, notable in medicine and famous in ecclesiastical polemics, was born at Baden in Switzerland, September 7, 1524. The name E. is a translation of his German patronymic *Lieber*. After an education in his native town, he studied divinity at Basel, and then medicine at Bologna. E. remained nine years in Italy, and on his return was made Professor of Physic in the University of Heidelberg. In 1581 he accepted the same chair at Basel, and died there 31st December 1583. E. left by will a large sum for the education of poor students of medicine, and this bequest, called the *Erastian Foundation*, long perpetuated his name. His chief work is his *Explicatio Quæstionis Gravissimæ de Excommunicatione*. During his whole life E. was the vigorous opponent of those who argued that the ecclesiastical authority should punish crimes and offences. The right of excommunication was that which E. chiefly attacked, but absolution, interdiction, the imposition of penance, &c., are also discussed. From the opinions in this book the term *Erastianism* has arisen, which has been much used in Scotland, and generally misused. E. merely asserts that misdemeanours should be punished not by ecclesiastical but by civil authority, but in Scotland many people who never heard of E. are accustomed to describe as *Erastian* the policy which repudiates the doctrine of the spiritual independence of the Church. E.'s work, translated into English in 1669, was re-edited by Dr Lee of Edinburgh in 1845. Among E.'s scientific and medical works are his *De Discrimine Logicæ et Scientiæ Demonstrativæ* (1565), *Theses de Contagio* (Heidelb. 1574), and *De Occult. Pharmaco-Potestatibus* (Heidelb. 1574).

Era'sure, or **Ra'zure**, as it is sometimes called in England, is in law the obliteration of any letter or word in a legal writing. In England the presumption of law, except as regards a will, appears to be, when there is an E. in a deed, that it has been made previous to execution. Should this presumption be overcome by evidence to the contrary, the deed is not necessarily void. If sufficient evidence can be adduced to prove the intention of the granter, this will be given effect to. If this, however, cannot be done, E. proved to be subsequent to execution renders the writing void. In making a will, if there are any erasures or Interlineations (q. v.), the testator should put his initials on the margin opposite them, and 'notice them in the *attestation*.' (See Lord St Leonard's *Handybook*; also WILL, CANCELLING.) In Scotch law, deeds or other formal instruments erased *in substantialibus*—that is, in those parts essential to their validity—are not held probative, and the defect cannot be supplied by parole evidence. An E. in a non-vital part of a deed should be declared in the body of the writing, by stating that the superscribed words are written on an E. But when correction is required from clerical error or other cause, the proper way is to draw the pen through the erroneous words so as to leave them still legible, and to add with a mark of reference the correct words on the margin, the addition being signed by the party to the deed writing his Christian name on one side and his surname on the other. (See Menzies' *Lectures on Conveyancing*, p. 124.) In bookkeeping an E. should never be made, as if the book were judicially inspected the E. might cause suspicion of fraud. An error should be deleted with the pen so as to leave the words or figures legible. The statute 6 and 7 Will. IV. c. 33, to increase the security afforded by the public records of deeds and instruments affecting land in Scotland, enacts that an instrument of sasine shall not be rendered void by any part of it being written on an E., unless it be averred and proved that the E. was fraudulently made, or unless the record does not correspond with the instrument. There are, however, some exceptions to the operation of this statute.

Erato ('the lovely'), in Greek mythology, one of the Nine Muses. She presided over erotic poetry and mimic invention, and is sometimes represented as the Muse of the lyre.

Eratos'thenes, a famous Greek writer, son of Aglaus, was born at Cyrene, 276 B.C. His preceptors were Aristo the Chian, Lysanias, and Callimachus. He devoted himself to grammatical criticism, philosophy, astronomy, and poetry. Ptolemy Euergetes appointed him librarian at Alexandria, a position which he filled till his death. E. was a man of most extensive and varied learning. He wrote on the *Old Attic Comedy* and on the *Homeric Poems*, composed several philosophical and historical works, raised geography to the rank of a science, founded geodesy, and made important discoveries in astronomy and geometry. His chief work was a treatise on geography, which Strabo made large use of. He measured the obliquity of the ecliptic, and was the originator of the process by which the magnitude of the earth is found. He voluntarily starved himself to death at the age of eighty, 196 B.C. For a complete list of his works, see the *Eratosthenica* of Bernhardy (Berlin, 1822).

Ercill'a, y Zuñiga, Alonso de, a Spanish epic poet, was born at Madrid, or, according to others, in Biscay, 7th August 1533. At the age of fourteen he became page to the Prince of the Asturias, afterwards Philip II. In 1554 he came to London in the train of Philip, on the occasion of his marriage with Queen Mary. While there, E. learned that the Indians of Arauca, a district of Chili, had revolted against the Spaniards. He joined the expedition dispatched to quell the rebellion, and made this war the theme of an epic. The poem, begun in 1558, was composed during the campaign, being written on scraps of paper, and even of leather, when no better material could be had. Philip, whom he had addressed as his Augustus in the *Araucana* (1569–90), treated him with neglect on his return to Spain; and the soldier-poet died at Madrid in want and obscurity some time after the year 1596. E.'s epic, the *Araucana*, is in thirty-six cantos of octosyllabic verse. Not only the subject, but the treatment also to a great extent, is historical. The work has been praised by Cervantes and Lope de Vega. The best Spanish edition is that published at Madrid in 1828. A German translation by Winterling was published at Nuremberg in 1831.

Erckmann (Émile), and **Chatrian (Alexandre)**, two modern French novelists, the former born at Phalsburg, Meurthe, 20th May 1822, the latter at Soldatenthal, also in Meurthe, 18th December 1826. Both belonging to the middle class, they met at the college of Phalsburg, and later went to Paris, where they

set up a literary partnership, producing unitedly a series of plays and tales. After two years of hard struggling, their *Illustre Docteur Mathéus* (1859) at last stirred the public interest, which has since been kept from flagging by *Contes Fantastiques* (1860), *Le Fou Yégof* (1862), *Le Joueur de Clarinette* (1863), *Le Conscrit de 1813* (1864), *Waterloo* (1865), *L'Homme du Peuple* (1865), *La Maison Forestière* (1866), *Le Blocus* (1867), *Histoire d'un Paysan* (1868), *Story of the Plébiscite* (English, 1872), and *Brigadier Frédéric* (1875). These are written in a simple unaffected style, in harmony with the pathetic, picturesque studies of peasant life which form the background on which are dashed in vivid colours, and with realistic touch, the military glories and horrors of the Revolution and Empire. The most successful play of E.-C. is *Le Juif Polonais* (1869), produced in England as *The Bells* (1871), rendered popular by the acting of J. H. Irving.

Er'ebus, the son of Chaos. The name signifies darkness generally, and is specially applied to the gloomy region of the under-world through which the shades pass to Hades.

Erech'theus or **Erichtho'nius**, and **Erechthe'um**. Erechtheus or Erichthonius is reputed to have sprung from Attic soil in marriage with Hephæstus. He was reared by Athena. When grown up, he usurped the government of Athens, instituted the worship of Athena, and built her a temple on the Acropolis. This temple, called after him the *Erechtheum*, was the most revered of all the Athenian sanctuaries. It contained the olive-wood statue of Athena Polias that was said to have fallen from heaven, the sacred olive-tree which the goddess called forth in her contest with Poseidon, the tombs of Cecrops and of E. himself. It was burnt by the Persians, but was replaced in the beginning of the 4th c. B.C. by an Ionic structure, one of the triumphs of Athenian architecture. By his wife Praxithea E. had four sons and four daughters. The daughters, Procris, Creusa, Chthonia, and Orithyia, agreed that if one of them were to die the others should not survive her. When Chthonia was sacrificed for the welfare of Athens, two of her sisters kept their vow. The legend of Chthonia is beautifully told in Swinburne's tragedy of *Erechtheus* (Lond. 1876).

Erec'tile Tiss'ue, a kind of tissue found in certain organs which are sometimes rendered turgid by distension with blood. It consists of a network formed of fibrous, elastic, and perhaps contractile bands, called *trabeculæ*, in the meshes of which there are numerous blood-vessels, chiefly veins. These veins communicate with small arteries, and under certain nervous conditions, become distended with blood, causing the organ to swell and to be erected.

Erec'tion, Lords of. Those to whom the king, in Scotland, after the Reformation made grants, *jure coronæ*, of the lands or tithes which had formerly belonged to the Popish ecclesiastical establishment, were so entitled, because under their grants they had the same rights to the erected benefices which were formerly vested in the Church. Sometimes those so gifted were called titulars of the tithes. Those grants were made under the burden of providing competent stipends to the Reformed clergy. See TEINDS.

Erect Vision. See EYE.

Er'emites (Gr. *erēmitēs*, from *erēmos*, 'lonely,' 'desert'), or **Her'mits**, the name of the early Christian solitaries, who in the East, and especially in Egypt, withdrew to the desert, and spent their lives in lonely prayer, rigorous abstinence, and often in self-mortification. (See ANCHORITES and ASCETICISM.) This practice of retirement began in the 2d c., and became common in the first half of the 4th c. It may have been suggested by the *Therapeutæ* (q. v.). The severe watchings and fastings of these recluses often gave rise to insanity, and an asylum for such as were incurably deranged was established at Jerusalem. From the strange hallucinations to which they were subject much of mediæval demonology originated. The E. were strict observers of celibacy, and gradually gathered into monastic communities, the first of which is said to have been founded by Hilarion. (See MONASTICISM.) A famous eremite was soon surrounded by imitators, who were formed into a cœnobite community, while many E. who did not join the monastery girt it with a *laura* or circle of separate cells. E. were common during the middle ages, when they gathered into brotherhoods, of which the most famous were the Hermits of St Augustine. See Helyot's *Histoire des Ordres Religieux*, and Lecky's *History of Rationalism*.

Er'furt (anc. *Erpisford*, 'the ford of Erpe'), the old capital of Thuringia, now a town of Prussian Saxony, on the Gera, in a fertile plain, 14 miles W. of Weimar by rail. E. was formerly a fortress of the second rank. Its original fortifications have been strengthened by two citadels and other outworks. Among the most noteworthy buildings are the Gothic cathedral, with a portal of the 12th c., and the great Susanna, one of its ten bells, weighing 275 cwt.; the Severikirche, of the 14th c., with three copper-covered towers; the Augustinian monastery (now an orphanage) in which Luther was a monk, and the new Town Hall, opened 1876 at a cost of £37,000. Of the university, suppressed in 1816, there still remain the observatory, the anatomical theatre, and the botanic garden. In the fish-market is a monument to Roland. E. has important manufactures of woollens, cottons, silks, ribbons, hosiery, carpets, tapestry, leather, tobacco, chemicals, ironmongery, and machinery. In the neighbourhood of E. is a rock-salt mine, which in 1872 yielded 500,000 cwt. of salt. Pop. (1871) 43,616, of whom 3167 were soldiers. Only an insignificant place in the 8th c., at the end of the 16th c. it was a Hanse town, and twice as large as it is now.

Er'got, a powerful and important therapeutic agent, obtained chiefly from *Secale cereale* or common rye, by the action of a fungus which changes the appearance and constitution of the grain, and thus forms *Secale cornutum* or 'spurred rye.' The fungus which produces E. is found in other grasses (*Lolium arvense* and *L. perenne*, &c.), but does not produce so characteristic effects as on rye. The E. fungus consists of a mass of polygonal cells containing an oily fluid. It appears within the seed or ovule of rye, and propagates itself at the expense of the seeds. Whatever doubts may exist as to the nature of the E.-producing fungus, none exist regarding the powerful action of the substance itself. The active principle of the E. appears to exist in a fixed oil, of which it contains about 35 per cent. The active substance is *ergotine*, a reddish-brown substance, of which E. contains about 15 per cent. The therapeutic properties are extracted by alcohol and water. E. is first mentioned as a therapeutic agent by Camerarius in 1668, and in 1669 by Dr Bautzmanni, both writers describing the substance as one calculated to hasten labour in woman. In 1774 its use was prohibited by law in France, on account of its reputed virulence, but in 1777 Desgranges of Lyon again used E., and extolled it as an obstetric aid. In 1873 Dr Prescott of New York directed attention anew to the value of E. Now it is largely employed in midwifery, as well as in amenorrhœa or defective menstruation, in various uterine affections, in gonorrhœa, paralysis, and other lesions. The therapeutic uses of E. are chiefly to induce uterine action in the expulsion of the child. After swallowing a medicinal dose (xx. minims) of E., the contractions of the uterus in labour become more frequent and stronger. The action of E. generally sets in at various periods, varying from five minutes to half an hour, and is supposed to be due to a special effect on the muscular fibre of the uterus, but there is little doubt that it also acts on the spinal cord and nerve-centres generally. Dr Tyler Smith says that the blood is the medium through which E. specially acts. When taken in a poisonous dose, E. appears to induce the state termed *ergotism*, characterised by depression, coldness, and gangrene or mortification of the extremities, or by convulsions. The latter form of ergotism was seen at Silesia in 1722, and at Berlin in 1723, being induced by eating bread made from ergotised rye. Pain, itching, and tingling in the feet were first observed, convulsions followed, and mania or coma in turn succeeded.

Er'iach. By the Irish Brehon Law, in a case of murder, the brehon or judge caused the murderer to give the wife or child of the murdered man a recompense, called an E. The term corresponds to the ancient *were* in England.

Erica'ceæ, or **Eri'ceæ**, a natural order of Exogens, including the heaths and allied species of plants. These plants are widely distributed in arctic and temperate zones in both hemispheres, save in Australia. They are found on the mountain ranges of the tropics. The genus *Erica* itself is very common in S. Africa. The British genera number seven, with twenty-three species. The E. are wiry shrubs, with eight or ten stamens, the latter being epigynous or hypogynous. *E. cinerea*, a Scotch heath, and a familiar example of the order, is a low bushy shrub, with linear leaves and racemose clusters of purple flowers. The corolla

is persistent in many heaths, the anthers dehiscing, or opening by superior pores. The fruit in the heaths is a capsule. Amongst other genera of this order are the Rhododendrons (q. v.), azaleas, kalmias, ledum, &c.

Er'icht, or **Err'ocht, Loch**, in a dreary waste partly in Perthshire and partly in Inverness-shire, at the foot of Ben Aulder, one of the Grampians, and about 1500 feet above the sea-level. It is about 15 miles long by 1 broad, and has communication with Lochs Rannoch and Lydoch. E. is said never to freeze.

Er'icsson, Johan, a Swedish engineer, born 31st July 1803. He came to England after serving some years in the Swedish army, and took an active part in the introduction of the screw-propeller about 1837. Two years later he went to America, where he perfected his caloric engine in 1852, and constructed the famous ironclad *Monitor* in 1862.—**Nils E.**, brother of the preceding, was born 31st Jan. 1802, and was head of the corps of Swedish naval engineers from 1850. He also constructed the Swedish railways (1858–63), the canal between the Saiman and the Gulf of Finland, and improved the Stockholm docks, &c. In 1860 he was made a baron, and died 8th September 1870.

E'rie, a town of Pennsylvania, on the shores of Lake E. Its harbour, one of the best on the lake, is formed by Presque Isle, 4 miles long. The bay is 3½ miles long, from 9 to 25 feet deep, and is well protected by a breakwater. E. is also connected with the Ohio by a canal, and is the terminus of the Philadelphia and Erie Railway. Pop. (1870) 19,646.

Erie Lake, one of the five great lakes of N. America which give rise to the St Lawrence, and with it form an unrivalled channel of inland navigation. It is fourth in size and position, having the larger lakes Superior, Michigan, and Huron above, and Ontario, the smaller, below it, with the province of Ontario on the N., and the states of Ohio, Pennsylvania, and New York on the S. E. has a length of 240 miles, with an area of 9600 sq. miles, and it is 555 feet above the ocean. It has a mean depth of only 120 feet, rendering storms frequent and navigation dangerous. The chief United States harbours are Erie, Cleveland, Sandusky, and Toledo; the Canadian, Ports Dover, Burwell, and Stanley. The current of Niagara, running northward, carries the waters of the lake into the Ontario. Ice interrupts navigation from December till March or April. The Welland Canal connects E. and Ontario, and numerous railways and canals render the lake a busy scene of traffic.—*E. Canal*, a work of great utility, extends from the Hudson above Albany to Buffalo on Lake E.—*E. Railroad*, one of the chief routes to the W., extends from Jersey city near New York to Dunkirk on Lake E.

Erig'ena, Joannes Scotus, a mediæval philosopher, and, according to Hallam, 'the greatest man of the dark ages,' was born in Ireland—hence the name E.—in the beginning of the 9th c. He spent his life, which is veiled in obscurity, chiefly at the court of Karl the Bald, in whose palace-school he seems to have been a teacher, and died about 875. He was the founder of mediæval philosophy, but differs broadly from the later scholastics, who were rigid followers of Aristotle and devoted to casuistic hair-splitting, while E.'s works are imbued with Neo-Platonic idealism. He held that nature was the manifestation of God under certain forms; that God was the vital essence pervading all things. The audacity of some of his propositions was perhaps only partly visible to himself. He declared reason to be prior in time to authority, and all authority which was not based on reason to be worthless. His chief writings are *De Divisione Naturæ*, a pantheistic treatise (Oxf. 1681, and Munst. 1838); *De Divina Prædestinatione*, a work on theology (1650); a translation and commentary on the works ascribed to Dionysius the Areopagite; a homily, several pieces in verse, a treatise on the Eucharist, and a small work, *De Visione Dei*. See St René Taillandier's *E. et la Phil. Scholastique* (Strasb. 1843); Christlieb's *Leben und Lehre des Scot E.* (Gotha 1860); Haureau's *De la Philosophie Scholastique* (1850); and Maurice's *Mediæval Philosophy* (1859).

Erig'eron, a genus of plants of the natural order *Compositæ*. *E. acris* is a common British species, familiarly named 'fleabane,' from its odour being said to keep away fleas and other insect pests. This species is about 16 or 17 inches high, and its flower-heads exhibit pale-blue 'ray' florets, those of the centre being yellow. An American species (*E. Philadelphicum*) has ray florets of a purple hue, and possesses diuretic properties.

Er'ik, a common name of Danish, Swedish, and Norwegian kings.

1st, *Danish*.—**E. Barn** ('the child' or 'bairn'), 840–860, began the Danish system of foreign invasions.—**E. Ejegod** (or 'good for the eyes'), one of the fourteen sons of Svend Estridsen, whose line followed the old line of Gorm, ascended the throne of Denmark in 1095. Driven from home when his eldest brother, St Knud, was murdered at Odense, E. had travelled and acquired many languages. He cleared part of the Danish coast from the Wendish pirates, and encouraged the formation of the early guilds. Having killed a servant, he undertook, with his queen Botilda, a pilgrimage to Jerusalem (although his loving people offered one-third of their substance as a blood-fine), but died at Cyprus, 1103.—**E. Emun** (or 'the Boaster'), a younger son of Ejegod, appears in history as the avenger of his brother Knud, whom the king Niels and his son Magnus had treacherously killed at Ringsted in 1134. The Boaster appealed to the 'Thing,' who gave him help; and thus he won the battle of Fodevig in Skaania. Niels fled, and E. became king. Although successful against the Wends, he tarnished his memory by the murder of his brother, Harald Kezia; and his son, E. 'the Lamb,' was a monkish coward, who died in 1147, leaving Denmark a legacy of ten years' civil war, in which the *Bondar* or free peasants were oppressed. E. introduced the use of cavalry to Denmark.—**E. Plov-penning** (or 'plough-money,' so called from an unpopular tax imposed on ploughs) was the eldest surviving son of Valdemar II. He succeeded his father in 1241, and in 1250 was murdered at the instigation of his brother Abel, Duke of Slesvig, who, along with Christopher of Laaland and Nikolaus of Halland, had kept the land in continual dissension. —**E. Glipping** (or 'the Blinker'), the son of Christopher I. and Margaret of Pommern, succeeded his father on the throne in 1259. He conceded certain rights of jurisdiction to the nobility and clergy. E. was a weak vicious king, and was murdered in 1286.—**E. Menved** (or 'with a but,' so called because he could not resolve on anything), the son of the preceding, succeeded to the throne, which was for some time practically occupied by his mother, Agnes of Brandenburg. The chief murderers of the late king, Stig and Raul Jonsen, were punished. Expensive wars with Poland and Norway led to the gradual alienation of the crown-lands, till most of the herring-fisheries were sold to the Hanse traders. E. had fourteen children by Ingeborg of Sweden, but they all predeceased their father, who died in 1319.

2d, *Swedish*.—**E. Sejersoel** ('the Victorious'), a descendant of Ragnar Lodbrog and Björn Jernside ('Ironside'), reigned in Sweden from 983 to 993. He defeated the pagan Vikings of Jomsborg, and, according to Adam of Bremen, even conquered Svend Estridsen, the King of Denmark. The heroic song of Hjalteson, celebrating E.'s victory of Fryisvall, is one of the oldest monuments of Swedish.—**E. IX.** ('the Saint'), a member of the peasant class, succeeded in 1155 to the throne of Sverker I., who had just by negotiation with Cardinal Albinensis, brought the Swedish Church into close communion with Rome. E. had three rules of policy—'to build churches, to govern according to law and right, and to overpower his enemies.' He was also called *Lag-gifware* ('lawgiver'). He warred against the Finns, and compelled them to accept Christianity. E. was killed by the Dane, Magnus Henriksen, in 1160.—**E. Knutsson** (or *Arkonung*, 'good-years'), grandson of the preceding, after the long struggle between the Sverkers and the Bondars, received the Swedish crown by the help of the Church (1210). As a recompense, he surrendered part of a royal right (*sakören*) to the clergy. His son, **E. Læspe** (or 'the Halt'), nominally ruled in Sweden from 1222 to 1250.—**E. XII.**, the son of King Magnus of Sweden and Norway, was constantly disputing the sovereignty with his father till his death in 1359.—**E. of Pommern** was the nephew of the wise and good Margaret, widow of Hakon of Norway, and mother of Olaf of Denmark. This remarkable woman, after the Kalmar Act of Union in 1397, conjoined E. with herself in the enjoyment of the triple crown. Margaret died in 1412, just after concluding a peace with Holstein, which E. disregarded, and commenced a cruel war that lasted twenty-five years. In 1423 the Emperor Sigismund decreed that the territory of Slesvig

should be given to E., but instead of taking advantage of this, he went off on a crazy expedition to Jerusalem. A dalesman called Engelbrecht now stirred up a rebellion in Dalekarlia and Westmannland, and compelled the council of state at Stockholm to sign a deed saying that E. had broken his coronation oath. The nobles did not join this popular movement, but in 1436 agreed to a new Act of Union of the three kingdoms. In 1439 all Sweden revolted under the viceroy Karl Knudsson Bondar, and Denmark and Norway deposed E. in favour of Christopher of Oldenburg.—**E. XIV.** was the son of the hero Gustaf Vasa and Katharine of Sachsen-Lauenberg. When he succeeded his father in 1560, he was on the point of starting for England to ask Elizabeth to marry him, a match in which Calvin interested himself. He was accomplished, but passionate, much under the influence of French acquaintances. He challenged Leicester to single combat, and afterwards sent 10,000 dollars to his envoy Gyllenstjerna that he might get rid of his rival. E. plunged into a seven years' war about a question of armorial bearings with Frederik II. of Denmark, and under the evil counsel of Göran Persson committed great excesses, and finally fell into madness, from which he was rescued by a peasant girl, Karen Mannsdatter, whom he married in 1567. By a combination of his brothers E. was, in 1569, brought to trial before the assembled states, and declared to have forfeited his own and his children's rights to the throne. He died by poison in prison eight years later, leaving a strange diary of the later events of his reign.

3d, *Norwegian.*—**E. Blod-öxe**, the eldest son of Harald Haarfager, succeeded his father on the throne of Norway in 936. Shortly after, on account of their cruelty, he and his queen Gunhild were driven away. They took refuge at the court of Æthelstan in England, where E. was made ruler of the sub-kingdom of Northumbria. His son, **E. Graafell**, was king for some years (963-977), and his son's half-cousin, **E. Jarl**, obtained the crown in 1000, after defeating Olaf Trygvassen in the great sea-battle of Svold, on the coast of Pommern. To this period belonged E. Raudi (or 'the Red'), who, with his son Leif, founded in Greenland the colonies of *Oestre Bygd* and *Vestre Bygd*, afterwards destroyed by the black death. The Icelandic chronicles assert that Leif, or his successors, passed over to Nova Scotia and S. Canada, which they called Vineland. The last Bishop of Greenland was sent in 1448.—**E. Præste-hader** (or 'priest-hater'), the eldest son of Magnus *Laga-bœter* ('law-betterer') and Ingeborg of Denmark, succeeded his father in 1280. He did little but quarrel with the Danes and Scotch about the dowries of his mother and daughter (Margrete, the Little Maid of Norway), with the Hanse, and with the clergy, whose exemptions from taxation he discontinued.

Erina'ceus. See HEDGEHOG.

Erinn'a, a famous Greek poetess, was born at Rhodes or the adjacent island of Telos, about 612 B.C. Common tradition makes her the contemporary and friend of Sappho, credits her with beauty and genius, and places her on a level with Homer. She excelled in epic poetry, and also wrote lyrics and epigrams. One of her pieces, *The Distaff*, written in a dialect that is a mixture of Æolic and Doric, consisted of 300 lines. E. died at the age of nineteen. She had a place in the *Garland* of Meleager, in which the crocus, on account of its maiden paleness, was the emblem assigned to her. See Malzow's *De Erinnæ Lesbiæ, Vita et Reliquiis* (Petersb. 1836).

Eriocaula'ceæ, or **Eriocaulona'ceæ**, the 'pipewort' order of Monocotyledonous plants, inhabit marshes. They have small unisexual flowers with two-celled anthers, and an ovary surrounded by a toothed and membranous tube. S. America is the chief habitat of the E. The only British species is *E. septangulare*, the 'jointed pipewort,' found in Galway and Skye. Some of the Brazilian species of Eriocaulon are branching plants, which sometimes attain a height of over six feet. Over 200 species of E. are known.

Erioden'dron, a genus of Exogenous plants belonging to the natural order *Sterculiaceæ*, the 'silk-cotton' order. *E. Samanna* is a typical tree of the American *selvas*, and exceeds all other trees of the Amazon forests in height. It rarely branches till it has grown above the other trees. The genus closely resembles the species of *Malvaceæ* (or cotton order) in general characters, the seeds being embedded in a woolly matter. *E. Indicum* and *E. anfractuosum* occur in the E. Indies, and *E. Guineense* in Africa.

Erioph'orum, or **Cotton Grass**, a genus of Endogenous plants belonging to the *Cyperaceæ*, or sedges. These plants derive their familiar name from their long silky or cottony hairs round the fruit. The leaves have astringent properties. The silky filaments are used for making candle-wicks, and for stuffing cushions. *E. polystachyum* is the common sedge, and exists as a grass-like herb, the flowers of which are arranged in spikes.

Er'ith, a small town of Kent, on the right bank of the Thames, 14 miles S.W. of London, is a station on the North Kent Railway. Belvedere House, a hospital for merchant seamen, was formerly the residence of Sir Culling Eardley. In 1875 the pop. of E. was about 3000, of whom 700 were employed in the local ironworks of Messrs Eastons & Anderson. On the 8th December 1875, the workmen, refusing to continue on 'piece-work,' as required by their employers, came out on strike. The strike, which was regarded as a test case as to the right of employers to put their men on 'piece-work,' became a lock-out on the 22d January 1876. The struggle between the 'masters' and the 'men' arrested the attention of the whole country.

Erivan', the capital of the Russian government of E., in the lieutenancy of the Caucasus, on the Zenghi, 110 miles S.W. of Tiflis. It is a fortified town, on a bare plateau 3530 feet above the Black Sea. The houses are mean, and the streets narrow and unpaved. The fort stands on a basalt rock not far from the town. The inhabitants, who numbered 14,342 in 1867, are engaged in agriculture and gardening, and a few of them in commerce. Fruit and vines thrive well, and there is a considerable trade in dried apricots. E. was founded in the time of Timur; its fortress was built in the beginning of the 16th c. by Khan Rewan, who named it after himself. E. was formerly the capital of the Persian province of Aran, and played a prominent part in the wars between the Turks and the Persians from the 16th c. downwards. The Russian general Paskevitch took E. by storm in 1827; and in 1828 it was ceded to Russia, along with the province of the same name. E. suffered greatly by the earthquake of July 1840.—The *government* of E. has an area of 10,644 sq. miles, and a pop. (1871) of 452,001.

Erlang'en ('the dwelling near alder-trees'), a walled town in Middle Franconia, Bavaria, on the Regnitz, and on the Ludwig Canal, 12 miles N. of Nürnberg by railway. It consists of an old and new portion, the latter having been built since a great fire in 1706. The famous Protestant university founded here in 1746 is the principal building. It bears a high character as a school of orthodox theology, is attended by some 500 students, and has a library of 140,000 volumes, besides valuable scientific collections and botanical gardens. E. has large manufactures of cottons, hosiery, mirrors, tobacco, and is particularly famous for its beer, of which it produces 1,650,000 gallons yearly. Pop. (1871) 12,511. E. was one of the asylums for the French refugees on the revocation of the Edict of Nantes.

Er'lau ('alder-tree meadow'), a walled city and the capital of the comitat of Heves, Hungary, on a river of the same name, 75 miles E.N.E. of Pesth by railway. It is the seat of an archbishop, has a beautiful cathedral in the Grecian style, a lyceum with a large library, several monasteries, a richly-endowed hospital, and carries on an active trade in a celebrated red wine. Pop. (1869) 19,150, mostly Roman Catholic Magyars. A bishopric founded at E. in the 11th c. was made an archbishopric in 1804.

Ermenonville, a village of France, in the department of Oise, 17 miles S.E. of Senlis. It was early a seigneurie, and was made a vicomté by Henri IV., whose mistress, Gabrielle d'Estrées, lived here. The Marquis René de Girardin acquired the grounds in 1763, and the château was subsequently the residence of Rousseau, who died here, 3d July 1778, and whose tomb on the Isle des Peupliers is resorted to by many visitors. The beautiful park, which attracts so many Parisians in summer, has of late fallen into disrepair.

Er'mine, or **Sto'at** (*Mustela erminea*), a species of Carnivorous mammalia, belonging to the *Mustelidæ* or weasel family. It attains a length of about 14 inches. The summer colour of

the animal's fur is not unlike that of the weasel, the prevailing tint being a pale brown tinted with red, the toes and edges of the ears being white. In winter the fur undergoes a remarkable change, then becoming of a uniform white hue, or sometimes of a yellowish-white colour. The E. is accordingly with difficulty detected amid the snow. This animal inhabits Britain, especially in its N. parts, but also occurs in Siberia, N. Europe, and N. America. It is greatly sought after in winter on account of its fur, which is greatly valued. The præmolar teeth number eight in each jaw.

Ermine, in heraldry, is a field *argent* with a small *sable* pattern formed of spots and small triangles spread or powdered over it. *Ermines*, also called *contre-E.*, is a field *sable* with *argent* pattern powdered over it. *Erminois* is a field *or* powdered *sable* (Boutell and Aveling).

Erne (Gael. *Eirne*, so called from a tribe of the Firbolgs), the name of a river and two lakes in the county of Fermanagh, Ireland. The river rises in Lough Gowna, and after a N.W. course of 72 miles, during which it traverses Lough Oughter and Upper and Lower Loughs E., falls into Donegal Bay. It is navigable as high up as Ballyshannon. Upper Lough E., 12 miles long by 4½ broad, is one of the most picturesque lakes in Ireland. Lower Lough E. is 20 miles long and 7½ broad. The former has 90, and the latter 109 islets. Both loughs abound in salmon and trout, and are the haunts of numerous wildfowl in winter. Beautiful country-seats enliven the banks.

Erne, the name given to certain species of Raptorial birds belonging to the family *Falconidæ*, and which are also known under the name of 'eagles.' The common E. is the *Haliaëtus albicilla*, also known as the white-tailed or sea eagle; a bird which is common in Britain, and is a good example of the larger species of the family. This bird attains a length of three feet, and may measure over six feet in expanse of wings. The colour is dark brown, the rounded tail being white, the primary quills black, and the legs, toes, and beak yellow, whilst the head is furnished with elongated feathers. The food consists of fishes, but the E. is also known to seize the smaller animals. Another species of E. is that known by the name of bald or white-headed eagle (*H. leucocephalus*) of America, known by the white head and neck, by the deep-brown body, and by the white tail and tail-coverts.

Ernes'ti, Johann August, a German philologist and theologian, born at Tennstädt, Thuringia, August 4, 1707. He studied at Leipsic, where he became Professor of Ancient Literature in 1742, of Eloquence in 1756, and of Theology in 1759, and where he died, September 11, 1781. E. was an excellent linguist, and so graceful a Latinist as to be styled 'the German Cicero.' He introduced a new system of Biblical criticism, examining the grammar and style of Scripture in the manner applied to Greek and Latin classics. His chief works are an edition of *Cicero* (Leips. 1737–39), *Clavis Ciceronia* (1739), *Institutio Interpretis Novi Testamenti* (1761), *Prolusio pro Grammatica Interpretatione Librorum imprimis Sacrorum* (1749). See A. W. E.'s *Memoria J. A. E.* (1781).

Ernst, Elector of Saxony, and founder of the Ernestine line of Saxon princes, was born at Altenburg, 25th March 1441. He and his younger brother Albrecht were the victims in the episode known in German history as the *Prinzenraub* ('the stealing of the princes'). E. succeeded his father in 1464, ruled the entire principality conjointly with Albrecht for twenty-one years, and added Thuringia to his dominions in 1482. He eventually divided the territory with Albrecht, the founder of the Albertine branch of the family, and died at Kolditz, 22d March 1486. Among the later descendants of the stolen E. is the Prince Consort, Albert of Saxe-Coburg. See Schreiter, *Geschichte des Prinzenraubs* (Leips. 1804); Œrtel, *Genealogische Tafeln*, &c. (Leips. 1846); Carlyle's essay on the *Prinzenraub*.—**Ernst I.**, Duke of Sachsen-Gotha and Altenburg, and founder of the house of Gotha, born 24th December 1601, was a brother of the famous Bernhard of Weimar (q. v.), and a member of the Ernestine line of Saxony. He served with distinction in the Thirty Years' War as a colonel of horse under Gustavus Adolphus, and shared in the Protestant victory of Lützen (1632). After the battle of Nördlingen (1634) E. was long engaged in improving and remodelling his possessions, which had suffered terribly from the ravages of war. Many existing institutions are traceable to his wise and able rule, while his severe Lutheranism gained for him the surname of 'the Pious.' He died 26th March 1675. His line terminated in the death of Friedrich IV. in 1825. See Lives of E. by Gelbke (3 vols. Gotha, 1810), and Klaunig and Schneider (Leips. 1858).

Ernst, Heinrich Wilhelm, a German composer and violinist, born at Brünn in 1814. He first appeared before the public as a boy, and during upwards of twenty-five years played in the principal Continental cities and in London with very great success. His health compelled him about 1858 to go to Nice, where he died, 8th October 1865. His principal compositions are for the violin.

Er'ode (Virudu), a town in the district of Coimbatore, province of Madras, British India, 243 miles S.W. of Madras by rail and 55 N.E. of Coimbatore. Pop. (1871) 7817. It is situated on a canal issuing from the Bhawani, not far from the confluence of that river and the Kavari. It has some place in early history, but its modern importance is due to its being the junction of the South Indian Railway with the main Madras line.

Er'os, the Greek name of Cupid (q. v.).

Ero'sion (Lat. *erosio*, 'a gnawing or eating away') is the name applied to the action of ice or running water upon the surface of the earth, giving rise to the striated surfaces and *roches moutonnées* indicative of Glacier (q. v.) action, and cutting out ravines and valleys of varied appearance and magnitude. In the case of streams, it is not as a rule so much to the running water itself that E. is due as to the salts which it contains in solution and the particles of sand and mud which it holds in suspension. If the water were absolutely pure there would be no chemical, and little if any mechanical, action.

Erot'ic (Gr. *erōs*, 'love') signifies whatever relates to the passion of love. Thus Alcman, Sappho, Anacreon, Catullus, &c., whose chief theme is love, are termed E. poets, and their love-lays E. poetry. The title E. writers (*scriptores erotici*), however, is generally employed to describe the class of Greek romancers whose tales were the legitimate precursors of the modern novel. E. romance was doubtless a birth of the East—the Song of Solomon combines the passionate intensity of a hymeneal with the colour, fancy, and pictorial profusion of the most exquisite romance—but the earliest specimens of it which appeared in the Western world were the famous *Milesian Tales*, a collection which seems to have been as popular in its own day as was the *Decameron* in the middle ages. The E. writers flourished at a late period of Greek letters, and are generally inferior in style to the recognised 'classics;' but their aim was to please and to amuse, and doubtless their works were as eagerly sought after in the libraries of the 'Sosii' of the time as the latest novel now is at Mudie's. Of the E. writers may be mentioned Parthenius, Iamblichus, Alciphron, Xenophon the Ephesian, Aristænetus, Heliodorus, Longus, and Achilles Tatius in Greek, and the Latin writer Appuleius, whose *Golden Ass* contains many merry tales and the pre-eminently beautiful episode of *Cupid and Psyche*.

Erpe'nius, or **Van Erpen, Thomas**, born at Gorkum, 7th September 1584, on the suggestion of J. J. Scaliger devoted himself to Oriental languages. For this purpose he travelled to the great seats of learning, meeting Casaubon at Paris, where he acquired Arabic from an Egyptian. At Venice he picked up Persian and the Turkish and Ethiopian dialects from some resident natives. He then taught Arabic and Hebrew at Leyden, and received the important post of Oriental interpreter to the States-General. He reached singular purity and elegance in Arabic composition. E. died November 13, 1624. His chief work was an Arabic Grammar, a classical text-book till superseded at the beginning of this century by that of De Sacy. His Arabic printing-press at Leyden produced several works, such as *Two Centuries of Arabic Proverbs*, *Fables of Locman*, an Arabic Pentateuch, the Chronicle of Elmakin, &c. E. also wrote on the Hebrew and Syriac grammars.

Erran'tia, an order of *Annelida* (q. v.) or worms, represented by such genera as *Nereis*, *Eunice*, *Aphrodite*, &c. This group includes those forms which typically represent the *Annelida*, and which comprise the greater number of large active marine worms. The sides of the body are well provided in E. with the lateral appendages, consisting of *setæ* or bristles, &c., which assist

locomotion. Each joint or segment of the body bears two pairs of appendages, known respectively as *notopodia* and *neuropodia*. The gills or breathing organs are borne on the back or dorsal aspect of the segments. These animals are unisexual. The integument is soft.

Erra'ta (Lat. 'errors'), the list of errors which may have arisen in the printing or in the composition of a work, with their corrections, inserted indifferently at the commencement or at the end of the book. Typographical errors are now comparatively rare in printing-offices of any character. Formerly they were sometimes introduced intentionally, that the author might express as corrections of E. sentiments which he durst not exhibit in the body of the work. (See Disraeli's *Curiosities of Literature*, vol. i. Lond. 1865). Several ludicrous E. are known. The Vinegar Bible, printed at the Clarendon Press in 1717, is so called because in it the 'Parable of the Vineyard' is printed the 'Parable of the *Vinegar*.' The Stationers' Company incurred a heavy penalty for issuing an impression of the Bible in which the 'not' was accidentally omitted from the Seventh Commandment.

Errhines are medicines administered to produce sneezing and discharges from the nostrils, to relieve headaches and deafness depending upon obstructions in the Eustachian tube, as common snuff, powder of *Asarum Europæum*, and *Helenium autumnale* (sneeze-wort).

Error in Essentials. An error in an essential point vitiates a contract, on the ground that consent—on which the validity of all contracts depends, without which there can be no contract—has been only apparent. But the legal difficulty lies in determining what is an essential. For instance, if one man sells a piece of land to another, stating that it is of a certain extent, and it is found after completion of the contract to be larger or smaller than stated, neither fact will vitiate the contract, the law holding that each party should have inspected the subject of sale and satisfied himself. *Error calculi* (error in calculation) may always be rectified. See CLERICAL ERROR.

Error, Proceedings in, is the form in England by which an appeal is made to the superior court against the judgment of an inferior court. See APPEAL; BILL OF EXCEPTIONS; COURT OF JUDICATURE, SUPREME, ACTS; ERROR, WRIT OF.

Error, Writ of. In criminal cases, the judgment of the lower tribunals may be reversed by W. of E. The procedure is now only competent for defect in substance appearing on the record. Formal defect must be objected to before the jury is sworn, and it may then be amended. Appeal on the merits is not competent in criminal cases. See ERROR, PROCEEDINGS IN.

Errors of Observation may be divided into avoidable and unavoidable errors. The former can be easily eliminated by comparison with other observations; and to such belong, for instance, reading the number of degrees, minutes, &c., wrongly; but the latter class comprehends cases of a much more difficult nature, arising from the imperfections of the instruments in use, refraction, temperature, atmospheric pressure, the observer's own so-called personal error, and such like. Thus the astronomer has a number of observed values for the position of a star which most probably differ perceptibly from each other. How, then, is he best to combine these results to obtain the most probable value? The simplest method is of course to take the mean, and this is sufficiently true if the observations are all equally reliable, but if they be not so, they must first be reduced to the same weight by the employment of a proper factor. In comparing the observed position of a planet with its calculated position, the difference depends not only on the E. of O., but also on the errors of the elements assumed in the calculation. Cases of this last kind are much more difficult; but for further information reference is made to the article LEAST SQUARES, METHOD OF. Sir G. Airy's *E. of O.* (1861) is an excellent treatise on the subject.

Ersch, Johann Samuel, known as the founder of German bibliography, was born at Grossglogau, in Lower Silesia, June 23, 1766. He studied at Halle and Jena, and became Professor of Geography and Statistics at the former university in 1803. Among his works are a *Handbuch der Deutschen Literatur seit der Mitte des 18ten Jahrh. bis auf die neueste Zeit* (4 vols. Leips. 1812–14), the *Allgemeines Repertorium der Literatur* (8 vols. Jena, 1793–1809), and *La France Littéraire* (3 vols. Hamb. 1797–98, with two supplementary vols. 1802 and 1806). Along with Gruber he began the *Allgemeine Encyclopädie der Wissenschaften und Künste* (Leips. 1818, still unfinished). E. died at Halle, 16th January 1828.

Erse, a corruption of *Irish*, formerly used by the Lowlanders of Scotland as a synonym for *Gaelic*, in allusion to the Irish origin of the Western Highlanders. Thus Burns, in his *Address to the Deil*, says—

'But a' your doings to rehearse,
Your wily snares and fechtin' fierce,
Sin' that day Michael did you pierce
Down to this time,
Wad ding a *Lallan* tongue or *Erse*,
In prose or rhyme.'

Erskine, Rev. Ebenezer, an evangelical divine of the Church of Scotland, afterwards founder of the Secession Church, was a son of the Rev. Henry E., minister of Chirnside, a descendant of the Sheilfield branch of the Mar family. E. was born June 22, 1680, and entered Edinburgh University in 1693, taking his degree in 1697. He was licensed to preach in 1703, and soon after ordained minister of Portmoak. There he laboured for twenty-eight years with great assiduity, and laid the foundations of a wide popularity. He removed to the West Church of Stirling in 1731, and in the following year signalised himself by opposing an Act of the Assembly which he deemed favourable to error in doctrine and discipline. He preached against the prevalent 'defections,' in a sermon before the Synod of Perth and Stirling, and incurred the censure of the Church. He resented this, and while still holding the principle of a National Church, with a few other ministers set up the Secession Church in 1733. Fruitless efforts were made to restore unity, and in 1740 he was deposed. When the Secession was rent in twain in 1747, E. took the side of the Burghers, and was duly excommunicated by his late followers. He died June 2, 1754. E. was a preacher of great unction and a man of genuine piety. See Life of E. by Rev. Dr Harper.—**Rev. Ralph E.,** brother of Ebenezer E., was born in Northumberland, March 18, 1685, studied at Edinburgh University, and was ordained minister of Dunfermline in 1711. He took the same side as his brother in the Church controversy, assisted in the formation of the Secession, and was deposed in 1740. He died 6th November 1752. E. is the author of *Gospel Sonnets* and *Faith no Fancy*. The names of both brothers are still warmly cherished by the Scottish nation.

Er'skine, John, Baron of Dun, a Scottish theologian, born near Montrose in 1508 or 1509. He was educated at Aberdeen University, and was the first to encourage the study of Greek in Scotland. Buchanan called him 'a man of great learning.' He early embraced Protestantism, was both a preacher and soldier, and was one of the commission appointed in 1577 to arrange the scheme of Church government known as the *Second Book of Discipline*. E. died March 21, 1591.

Erskine, John, of Carnock, afterwards of Cardross, son of a gentleman who had served under the Prince of Orange, was born in 1695, entered the Faculty of Advocates in 1719, acted as Professor of Scots Law at Edinburgh from 1737 to 1765, published his *Principles of the Law of Scotland* in 1754, and composed, but did not publish, his *Institutes* in retirement. He died 1st March 1768, and the *Institutes* appeared in 1773. This work is a very accurate and comprehensive digest of the law of Scotland of the time. The learning in both the civil and the feudal law is adequate, and the arrangement of the whole subject is lucid. It has, accordingly, remained a standard institutional work for citation in the law-courts, although on some important subjects, particularly on mercantile law, the book is very meagre, a fact perhaps explained by the dulness of Scotch trade during the 18th c., and the superior attractions which the Rebellion and its consequences gave to the subject of heritable title. On the other hand, E. has no philosophical insight into the most general principles of law. He too blindly follows the written and traditional authority and the reason which authority gives for itself. Deficient in analysis, he was also without conception of the historical method in the treatment of legal problems. These shortcomings do not lessen the great value of his work as a digest of positive law. The *Institutes* have passed through eight editions, the best being those of Lord Ivory (1824–28) and Nicolson (1871). The *Principles* have been re-edited by Guthrie (Edinb. 1874).

Erskine, Harry, son of the tenth Earl of Buchan, and elder brother of Lord Chancellor E., was born at Edinburgh 1st November 1746, and called to the Scotch bar in 1768. Though not a great lawyer, his other gifts soon put him in the front rank of his profession, and made him one of the most popular men in Scotland. He was honourably distinguished for the attention he gave to the cases of poorer clients, and by the independence and consistency of his political principles. He acted as Lord Advocate under the short-lived Rockingham administration, and again under the Grenville ministry of 1806. In 1812 he retired from public life to Ammondell, in W. Lothian, where he died on 8th October 1817.

Erskine, Thomas, Lord, a younger brother of Harry E., was born 10th January 1750, educated at the High School of Edinburgh, and at the grammar-school and University of St Andrews. From 1764–68 he cruised about the W. Indies and S. America in H.M.S. *Tartar* under Sir David Lyndsay. He wished to enter the army, but could not find the money for a commission for some time. On his father's death E. became an ensign in the Royals or 1st Regiment of Foot, and married a good and beautiful wife, a daughter of Daniel Moore, Esq., M.P. for Marlow, in 1770. In 1772, his regiment having come to London, he made the acquaintance of Johnson, Burney, Reynolds, &c., at the house of Mrs Montagu, and published *Observations on the Prevailing Abuses in the British Army arising from the Corruption of Civil Government.* On the suggestion of Lord Mansfield, he abandoned the army for the law in 1775, and after the usual course of study, was called at Lincoln's Inn, 3d July 1778. His first appearance was in defence of Captain Baillie, who was prosecuted for libel for having exposed the gross abuses in Greenwich Hospital. A striking speech led the way to immediate professional success. In 1779 he defended Admiral Keppel, who was tried by court-martial on a charge of incapacity in the battle off Ushant. In 1781 he appeared for Lord George Gordon, and startled the propriety of the court by swearing in the course of his speech. Returned to Parliament for Portsmouth in 1783, he and John Scott (afterwards Lord Eldon) both made their maiden speeches on Fox's India Bill. Next year occurred the famous case of the Dean of St Asaph, who was tried for seditious libel, in republishing Sir W. Jones' little political tract, *A Dialogue between a Gentleman and a Farmer.* The case, as treated by Justice Buller, who nearly committed E. for contempt of court, rendered necessary Fox's Libel Bill, which made the jury judges of the law as well as the facts. From 1784 to 1790 E. was not in Parliament, but remained the private friend of Fox and Sheridan, and constantly rose in reputation at the bar. Perhaps the finest speech he ever delivered was in defence of Stockdale, who had published a pamphlet by Mr Logan, a Scotch minister, upholding Warren Hastings against his impeachers. In 1790 Portsmouth again returned him to Parliament, which he did not leave till he was made a peer. The 'Reign of Terror' under Lord Loughborough's Chancellorship now began, and E. had a crowd of political clients, such as Paine, Frost, the *Morning Chronicle*, &c. The suspension of the Habeas Corpus Act in 1794, in consequence of the growth of societies formed to secure parliamentary reform, led to the great cases of Hardy and Tooke, which placed him at the summit of his popularity. About this time he published *A View of the Causes and Consequences of the Present War with France*, which ran through thirty-seven editions. Going to Paris with Fox in 1802, he was introduced to Napoleon and also to the French bar at the *Cour de Cassation.* On Pitt's death in 1806, E. was created Lord E., and appointed Lord Chancellor. He quitted public life at the close of his Chancellorship in 1807, after which he wrote a preface to Fox's speeches, several pamphlets on Greek questions, and a political romance called *Armata.* He died at his brother's house in Scotland, 17th November 1823. E. was probably the most eloquent speaker which the English bar ever produced—a man of incomparable dexterity, firmness, and brilliant imagination. See Brougham's biography, prefixed to an edition of his speeches in 1847.

Erskine, Thomas, of Linlathen, born 13th October 1788, was the grandson of John E. of Carnock, and nephew of the Evangelical leader the Rev. John E. He was called to the Scotch bar, but did not practise. His life, which was private but not retired, was spent chiefly at Linlathen and Edinburgh, with occasional visits to Paris and Geneva. He died in March 1870. E.'s first literary effort was assisting in the Scotch editions of the works of Richard Baxter and John Gambold (1822). In his *Remarks on the Internal Evidence of Revealed Religion* he represents the incarnation as something contrived to produce a certain vivid effect, not otherwise producible, on the human mind, viz., a perception of God's infinite love. From this follows salvation, or the conscious habitual surrender of the human will to the divine. His *Unconditional Freeness of the Gospel*, a book warmly praised by Dr Chalmers, is still much read. He insists on the universality of the offer of pardon through Christ, which on the stricter Calvinistic view is inconsistent with election. Hence in his *Doctrine of Sacrifice*, he represents that the quickening Spirit of God has passed into every corrupt soul of man, and that there is a real freedom, or power of choice, to follow or to resist its suggestions. E.'s latest meditations are contained in a posthumous volume, *The Spiritual Order*, and Principal Shairp is writing his life. What attracted men towards E. was his sweet and earnest simplicity of religious faith. He formed a link between Scotland and the finer minds in the English Church. See Dr. Hanna's *Letters of T. E.*, 1800–40 (Edinb. 1877).

Eryn'go, or **Eryn'gium**, a genus of Exogenous plants belonging to the esculent or harmless section of the *Umbelliferæ* (q. v.). *E. campestre*, found in England and Ireland, furnishes 'E. root,' formerly used as a tonic. The sea-E. or holly (*E. maritimum*) is common on coast-lines, and its root is believed to possess tonic properties, alluded to by Falstaff. This root, as a sweetened preparation, is esteemed as an aperient and diuretic. Other species are *E. aquaticum* and *E. fœtidum* of the New World. These plants have stiff spinous leaves, capitate sessile flowers, and a large prickly involucre, with an obovate scaly fruit.

Erys'imum, a genus of Cruciferous plants, represented by *E. cheiranthoides*, popularly called 'worm-seed,' found in Europe and N. America. The popular name is derived from a former use of the seeds as a remedy for internal parasites. This plant has a four-sided 'pod' or fruit, is an annual, and attains a height of 16 or 18 inches. The leaves are small and lance-shaped, and the flowers yellow. *E. perfoliatum*, grown in Japan, affords a fixed oil from its seeds.

Erysip'elas, a febrile and inflammatory disease, associated with an Exanthematous Eruption (q. v.), which has a tendency to spread, and may involve the areolar tissue beneath. In England E. is sometimes called *St Anthony's Fire*, and in Scotland *Rose.* E. is not a disease of the skin, but the pathological phenomena resulting from the action of the poison on the skin are that the skin is diffusely inflamed, being either of a bright scarlet or rose-coloured tint, disappearing on pressure, but reappearing when the pressure is removed. The areolar tissue is generally involved. The face, head, and neck are the parts most frequently affected, but a considerable portion of the trunk, or one or both lower or upper extremities, may be involved. E. may terminate by desquamation, vesication, suppuration, or gangrene. The symptoms of E. are fever, muscular pains, quick pulse, white tongue, nausea, vomiting, deranged bowels, and sore throat. On the third day the fever is continuous, the tongue brown and dry, and there is pain, swelling, and tenderness of lymphatic glands of the neck, and the cutaneous inflammation appears. From the fifth to the eighth day the bright colour begins to disappear, and desquamation takes place. E. has a tendency to spread, and sometimes it is erratic. The head, face, and limbs are sometimes enormously swollen, the inflammation extending deeply into the subcutaneous tissue, followed by suppuration (*E. phlegmonodes*) or by gangrene (*E. gangrenosum*). Cause—some specific poison. Propagation—E. is a communicable disease. It has been affirmed and denied that it is contagious and infectious, but it certainly spreads by *fomites.* An attack of E. does not secure immunity, but rather predisposes. E. in the surgical wards of an hospital is a most dangerous disease. Destructive epidemics of E. have occurred both in Europe and America. Treatment—in mild cases, rest, saline laxatives, cooling drinks and low diet, diaphoretics, and opiates occasionally. Tincture of the perchloride of iron in bitter infusions was at one time considered a specific. Sulphites of sodium or potassium have been recommended for both internal and external use. Dry flour, or starch flour, dusted over the inflamed part is a soothing application, but the advantage of attempting

to limit the spread of E. by caustics or tincture of iodine is very doubtful.

Erythe'ma (Gr. *eruthēma*, 'redness') is a disease entirely distinct from erysipelas, the only symptom in common being that of redness of the skin. E. expresses inflammatory redness of the skin occurring in one or several patches of irregular form without pimples, vesicles, or pustules, and is produced by simple congestion of the cutaneous vessels. There is but slight swelling, except where there is serous effusion into the tissues of the skin. Acute E. terminates by subsidence of the redness and desquamation; chronic E. results in greater changes, and may terminate in psoriasis. E. is non-contagious, is occasionally produced by local irritation, but is generally symptomatic of constitutional or visceral disorder. The principles of treatment are to restore the functions of the system to healthy action, and to allay the local irritation by evaporating lotions, water dressings, warm fomentations, and ointments of various kinds.

Erythi'na. See CORAL FLOWER.

Erythræ'a. See CENTAURY.

Erythro'nium, a genus of Liliaceous (Endogenous) plants, represented by *E. dens canis*, the 'dog-tooth violet,' so named from the appearance of its little white-coloured bulbs. This plant grows in our gardens, and has drooping flowers. It is a native of Central Europe, and also occurs in Siberia.

Erythrophlœ'um, a genus of Exogens belonging to the *Leguminosæ*, and to the *Mimoseæ*, a gum-arabic section of that natural order. Of this genus *E. Guineense*, of Guinea, is a familiar species. It is a tree, attaining the height of 100 feet or more. Its red juice is used in ordeal by the native priests to test the innocence of an accused person.

Erythroxyla'ceæ, a natural order of Exogenous plants, distinguished by the flowers springing from overlapping scales. No calycine glands are developed, and plaited scales exist at the base of the petals. The ovules are anatropal, and possess no funiculi, or cords of attachment. *Erythroxylon coca* of Peru has long been famed for its supposed powers of sustaining the strength. It is the *ipadu* of the Indians; and Spruce remarks that with soma ipadu-leaves in his mouth an Indian will walk for two or three days without food and without any desire to sleep. The leaves act by stimulating the nervous system. An interesting communication corroborative of the effects of 'Coca' (q. v.) was made by Sir R. Christison to the Botanical Society of Edinburgh in 1876. *E. suberosum* of Brazil furnishes a brown dye from its bark.

Erzerum', or **Ersirum** (*Arsen-er-Rum*, 'the land of the Romans,' from being founded under the Eastern Roman Empire; Armen. *Karin* or *Garin Khalakh*), a fortified city and the capital of Turkish Armenia, on the river Kara-gu, a branch of the Euphrates, 125 miles S.E. of Trebizond, and 6000 feet above the level of the sea. It is the seat of an Armenian archbishop, and has a strong citadel, some forty mosques, several Armenian and Greek churches, and many bazaars and baths. The best buildings are of volcanic stone and sun-dried bricks, and the streets are narrow and filthy. E. is the entrepôt of a great caravan trade, chiefly in European manufactures, and in Eastern silks, shawls, cotton, tobacco, rice, and indigo. Annually some £2,000,000 worth of British goods alone are conveyed thus into Persia. The principal manufactures of E. are morocco leather, sheepskin pelisses, and iron and copper wares. Pop. 60,000, of whom five-sixths are Turks. A fortress was founded here, near the Syro-Armenian town of Arsen, and named Theodosiopolis, after Theodosius II., in 415 A.D. On the destruction of Arsen the inhabitants removed hither, and transferred the present name to their new abode. E. was pillaged in 1201 by the Seljuks, who destroyed, it is said, some 100 churches. It was taken by the Mongols in 1242, by the Turks in 1517, and by the Russians in 1829, but was restored to the Porte on the peace of Adrianople. A great part of it was destroyed by an earthquake in 1859.

Erz'gebirge (*i.e.*, 'metal mountains'), a mountain chain of Germany forming the boundary between Saxony and Bohemia and stretching from the Elbe valley in the N.E. to the Thüringerwald in the S.W., a distance of 120 miles. It reaches a height of 3804 feet in the Keilberg, and has an abrupt declivity on the S.E. side, where several affluents of the Elbe have their rise. The E., which is of granite formation, is rich in silver, tin, iron, cobalt, &c. To the S. of this range, at an altitude of 3162 feet, is Gottesgabe ('gift of God'), the highest town in Germany.

E'sau. The story of E.'s life is given in Gen. xxv.–xxxvi. Some modern critics, however, are of opinion that the patriarchal history has come down to us in a legendary form, and suggest that the name E. [of which two different explanations are given in Genesis (xxv. 25, and v. 30)] refers to the appearance of the country (Edom), in which red earth and rocks prevail, and of Mount Seir ('rough,' 'bristly,' *i.e.*, wooded). The higher antiquity of the Edomites (cf. Gen. xxxvi. 31), their friendship with the Israelites till the time of Saul, their conquest by David, the greater fruitfulness of Canaan as compared with Mount Seir, itself not unfruitful in parts, are thus supposed to be embodied in the legend, in which E., the elder of two twin brothers, is supplanted by the younger, Jacob (Israel), who gets the blessing of the fatness of the earth, and himself gets an inferior blessing. See Ewald's *Geschichte des Volkes Israel* (3d ed. Gött. 1869), and *The Bible for Young People*, by Drs Oort, Hooykaas, and Kuenen (Eng. trans. vol. i. 1873).

Escalade' (Ital. *scalata*, from Lat. *scala*, 'a ladder') is scaling a fortification by means of ladders. The ladders used consist of several pieces about twelve feet long, fitted together by sockets. The advance party of an E. is called the 'forlorn hope,' and though in their approach they are covered by the heavy firing of their comrades in the rear, the dangers to which they expose themselves are vastly greater than those to be met with in any other part of the field.

Escall'op, or **Escallop-Shell**, in heraldry, an indented shell; a badge belonging to noble pilgrims; the emblem of the apostle St James the Greater.

Escape'ment, the mechanical arrangement in watches and timepieces by which the circular motion of the wheels is converted into the oscillatory motion of the balance-wheel or pendulum. See HOROLOGY.

Escarp' (from Ital. *scarpa*), in fortification, is the side of the ditch next the fort, while the side of the ditch next the country is the counterscarp. The E. is usually *revetted* (faced) with masonry or wood.

Escarp'ment, the geological name of a steep or abrupt cliff formed by the outcrop of inclined beds.

Escaut, the French name of the river Scheldt (q. v.).

Esch'ar (Gr. *eschara*), a slough of disorganised tissue occasioned by burns or the application of caustics.

Escheat' is a term of feudal law denoting the incident by which lands or tenements revert to the sovereign or lord of the fee as the original grantor, on account of want of heir, or from forfeiture. Escheats are of two kinds—(1) Those forfeitures which belong to the sovereign from his prerogative when there is no heir to succeed to the inheritance; (2) those which belong to every lord of the manor, in virtue of his seigniory, under a royal grant. The law of E. presumes, upon the feudal system, that the blood of the person last seised in Fee Simple (q. v.) is extinct, from which it follows that what the feudal writers call *feodum apertum* must revert to the lord of the fee.

In Scotch law single E. is the forfeiture to the crown of one's movable estate on conviction of certain crimes. Formerly it followed denunciation for non-payment or non-performance of a civil debt or obligation. Liferent E. is the forfeiture to the superior of the annual profits of the vassal's lands. A total forfeiture to the crown of one's property is in Scotland a penalty attached to high treason only. Single E. is a penalty attached to a sentence of outlawry, fugitation, and other crimes. It ensues on sentence for a capital crime in Scotland.

Eschelles', **Les**, correctly **Échelles, Les** (Fr. 'the ladders'), a village in the S.E. of France, in the department of Savoie, about 11 miles S.W. of Chambéry. Pop. (1872) 531. In the road between Chambéry and E. lies a huge limestone cliff 800 feet high, which travellers were formerly obliged to cross by means of ladders, but which was pierced by a tunnel 1000 feet long and 25 in height and width, a work begun by Napoleon and completed by the King of Sardinia in 1817.

Esch'enbach, Wolfram von, a celebrated Minnesinger, was born at Eschenbach, near Ansbach, in the latter part of the 12th c. He belonged to a noble family, and spent his life in knightly pursuits. He was conspicuous among the minstrels competing in the *Wartburg Krieg* ('war of the Wartburg'), held at the court of Hermann, Landgraf of Thuringia, in 1207. After Hermann's death he retired to his paternal castle. He died about 1220. In his own time, says Schegel, E. was as celebrated as Dante. His poems, which are on chivalrous and allegorical themes, display great imagination and elegance of diction, and combine the tenderness of the *Minne-lieder* with the brilliant fancies of the Provençal lyrists. His best works are *Parzival, Titurel, Lohengrin,* and *Willehalm,* a legendary Prince of Orange, who figures in the romance of Charlemagne. The best edition of E.'s works is by Lachmann (Berl. 1833; 2d ed. 1854). San-Martre translated them into modern German in 1836 (2d ed. 1858), and Simrock translated part of them in 1842 (Stuttgart). A concordance to E.'s works was also published by San-Martre (Quedl. and Leips. 1867).

Esch'er, Heinrich, merchant, was born at Zürich in 1626, and was sent to Louis XIV. in 1663 to renew the peace, and to ask for a renewal of Swiss trading privileges in France. He died 21st April 1710.—**Johann Gaspard E.**, another Zürich man, was born 15th February 1678, educated as a lawyer, supported in the Great Council the cause of public education and religious toleration, and was also successful diplomatically with Cardinal Fleury. He died 23d December 1762.—**Hans Konrad E.** was born at Zürich, 24th August 1767. For his chief work, the embankment of the Linth and Glatz, he got the singular reward of adding *Von der Linth* to his name. Hans died 9th March 1823. His son, **Arnold E., Von der Linth** (born 8th June 1807, died at Zürich, 12th July 1872), has won a high reputation as a geologist.—**Johann Heinrich Alfred E.**, born at Zürich, 20th February 1819, and educated for the law at Berlin, Bonn, and Paris. After lecturing at home on Swiss federal law, he was in 1841 elected to the Great Council, of which he rapidly became Secretary and President. He joined Furrer in expelling the Jesuits (1845), and devoted much thought to the reorganisation of the cantonal schools. In 1848, as member of the Diet, E. intervened between Austria and Ticino, who were about to fight. He entirely approved of the new federal constitution and the increased centralisation. In the Bundesrath or Federal Council, which is an essential part of the new Bundestaat Constitution (adopted by plebiscite in 1874), E. has had much to do in forming the liberal and efficient system of education which Switzerland enjoys.

Eschscholt'zia, a genus of Exogenous plants belonging to the *Papaveraceæ*, or Poppy order. *E. Californica*, an annual common in our gardens, has large orange flowers. The floral receptacle grows up around the base of the ovary, and carries up along with it the stamens, calyx, and corolla, the calyx ultimately separating from the other parts, and resembling a candle-extinguisher in shape.

Esch'wege ('Ash-tree road'), a town in the province of Hessen-Nassau, Prussia, 28 miles S.E. of Cassel, on the Werra. Pop. (1871) 7371. E. has an old castle, two churches, a *real*-school, and a pro-gymnasium. It is famous for its industries—cloth, oil, soap, and glue-making—and has tobacco manufactories and breweries. It is sometimes called the 'Hessian Elberfeld.'

Esch'weiler ('Ash-tree dwelling'), an important manufacturing town in Rhenish Prussia, on the Inde, 9 miles E.N.E. of Aachen. Pop. (1871) 15,490. The principal industries are the manufacture of iron and tinned ware, machines, needles, iron-wire, silks, ribbons, leather, and waxcloth. E. has besides breweries, rolling-mills, copper forges, and lead and coal mines. Some of the coal-mines are 200 fathoms deep. In 1872 there were forty-eight pits with 5700 workmen, who produced 1,050,000 tons. Tin and silver are also found.

Esco'rial (Sp. *escoria*, 'dross,' in reference to the slag of exhausted mines found here) is a small town in the province, and 26 miles N.W. of the city, of Madrid, on the lower slope of the Sierra de Guadarrama; pop. about 2000. The town has sprung up beside the famous building—monastery and royal residence in one—of El E., which owes its origin to a vow made by Philip II. of Spain to commemorate St Lawrence in gratitude for the victory he had won at St Quentin on that saint's day (10th August), 1557. St Lawrence is said to have been roasted alive on a gridiron, and Philip's votive memorial was built in the form of that utensil. It cost five million ducats, is built of bluish granite, and though grotesque and *bizarre* in style, is lavishly decorated, and contains several valuable collections of books and Arabic MSS., of coins, and of frescoes and pictures by Giordano, Carduchi, Pellegrini, and other Italian masters. The crucifix in the oratory is enriched with diamonds, &c. The mortuary chapel (called the Pantheon) contains the remains of the Spanish kings from Karl I. (V.) to Ferdinand VII., with the exception of Ferdinand VI., who was buried at Madrid. See Casiri's catalogue of Arabic MSS. (*Bibliotheca Arabico-Hispanica*, 2 vols. Madrid, 1760–70), and Rotundo's *Historia Descriptiva, Artistica, y Pintoresca del Monasterio de San Lorenzo communamente llamado El E.* (Madrid, 1856–61).

Es'cort. See CONVOY.

Es'cuage (Old Fr. *escut*, 'a shield,' from Lat. *scutum*), in English feudal law, meant service of the shield, a kind of service by which the tenant was bound to follow his lord to war at his own charge. It also denoted compensation for military service.

Es'culin, an alkaloid obtained from the capsules of the fruit of *Æsculus hippocastanum* (horse-chestnut). E. is slightly bitter, almost insoluble in cold water, soluble in 12 parts of boiling water, and more soluble in alcohol. E. has been introduced in Lyon for the cure of ague and periodic neuralgia, in place of quinine. Dose, 15 grains twice a day. The bark was used for the same purpose in 1720, and during the wars of the French Republic, when the importation of cinchona was interrupted.

Escutch'eon (Old Fr. *escusson*, Span. and Port. *escudo*, Ital. *scudo*, Lat. *scutum*, 'shield') is the shield upon which arms are depicted, but the word is also used to express the whole coat of arms. *E. of Pretence*, is an inner shield bearing the arms of a wife who has brought lands as dowry.

Esdrae'lon is the Greek form of the Hebrew Jezreel, occurring only twice in the Apocryphal Book of Judith, iii. 9 and iv. 6. In Judith i. 8 the form is Esdrelom, and in chap. vii. 3, Esdraelom. The Plain of E. is triangular in shape, the mountains of Gilboa on the E. forming the base, the mountains of Galilee on the N. the one side, and Mount Carmel on the S.W. the other. Owing to its natural features it has been from time immemorial the battlefield of Syria, and from its position between Asia Minor and Egypt almost the battlefield of the East. It was the scene of the battle between Barak and Jabin (Judges iv.), Gideon and the Midianites and Amalekites (Judges vi., vii.), Saul and the Philistines (1 Sam. xxix. 1), Ahab and Benhadad (1 Kings xx.), and between Josiah and the Egyptians (2 Kings xxiii., where it is called Megiddo, from the town of that name which stood on its southern border). Here the Assyrians and Persians, the Crusaders and Saracens, the Egyptians and Turks, the Arabs and Franks have fought, and here Bonaparte gained one of his victories.

Es'dras is the name of two Apocryphal books originally written in Greek, and attributed to Ezra (Gr. *Esdras*). In the Vulgate they are called 3d and 4th E., 1st and 2d E. being the canonical books of Ezra and Nehemiah. This arrangement was followed in all the earlier editions of the English Bible; that now existing, of calling the Apocryphal books 1st and 2d E., was first adopted in the Geneva Bible. 1. E. consists of (1) the two last chapters of 2 Chron. nearly verbatim; (2) an original portion, written, probably in Egypt, in imitation of Esther and Daniel, and giving the history of three young men at the court of Darius; (3) the Book of Ezra differently arranged; and (4) a portion of Nehemiah. 2. E., or the Revelation of E., the date of which has been fixed variously from 28 B.C. to 69 A.D., and which was also probably written in Egypt, consists, as in English, of (1) two passages (cc. i., ii., and xv., xvi.) not found in the Ar. and Eth. versions, but interpolated in the Lat. text; (2) a passage after vii. 35, found in the Ar. and Eth. and omitted in the Lat. (probably from its denying the efficacy of human intercession after death); and (3) the original Apocalypse, consisting of a series of three revelations and three visions to Ezra, followed by the appearance to him of the Lord, from whom he receives the law.

Esenbeck'ia, a genus of plants belonging to the *Rutaceæ* or Rue order, and represented by *E. febrifuga*, which is employed in Brazil as a substitute for Peruvian bark.

Esk (Cymric, *wysk*, Gael. *uisk*, 'water'), the name of several streams in Scotland, of which five are worthy of note:—1. The Dumfriesshire E., rising on the borders of Selkirk, near Ettrick Pen, and flowing in its upper course through the wild pastoral solitudes of Eskdalemuir, and in its lower course through the richer scenery of Cumberland, falling into the Solway at the head of the estuary after a southerly course of 45 miles. This is the river of Young Lochinvar. 'He swam the E. river where ford there was none.' 2 and 3. The N. and S.E. in Midlothian, which rise in Peeblesshire and flow N.N.E., uniting in Dalkeith Park, and entering the Firth of Forth at Musselburgh after a course of 23 miles. The N. branch passes through the romantic ravines of Roslin and Hawthornden. 4 and 5. The Forfarshire Esks, both of which have their source in the eastern Grampians, the more northerly and lesser of the two reaching the sea 4 miles N. of Montrose after a course of 25 miles; the southerly and larger stream crossing the valley of Strathmore, passing Brechin, and falling into the Bay of Montrose after an easterly course of 40 miles. The southern English form of this Celtic word is *Exe* or *Axe* (q. v.).

Es'ki-Djumma'sa ('Old commune'), a town in the vilayet of the Danube, or Bulgaria, European Turkey, 18 miles W. by S. of Shumla, near the Kamchik springs, has a culture of silk and large fairs. Pop. 10,000.

Eskimo Dog, a variety of Dogs (q. v.), so named from its being found associated with the Eskimos and other Northern tribes in Europe, N. America, and Asia. It is extensively used in Arctic travelling for drawing sledges, and is very hardy and sagacious. The general colour is a dark grey, and the average size about that of a pointer. The outer hair is coarse and stiff, but a warm softer inner coat exists. The ears are short and pointed, and the bushy tail is generally curled over the back.

Es'kimos (native name, *Inuit*, 'the people'), called by the Abenaki—an aboriginal people who at one time inhabited the country afterwards known as New England—*Eskimantsic*, or 'eaters of raw flesh.' The Abenaki applied this name to the tribes on the coasts of Labrador; the early French Canadians converted it into *Eskimaux* or *Esquimaux*. Dr Latham and other recent ethnologists write it *Eskimos*, after the Danish orthography; while Dr Henry Rink, following the same orthography, uses the name *Eskimo* both in a singular and in a plural sense. The E. are a distinctive and singular people inhabiting Greenland and Labrador, the N. American shores, the inhabited islands of the N. American Archipelago, and part of the coast regions of the extreme N.E. of Siberia. They are spread over an insular region and a coast-line 5000 miles in extent, but they never penetrate inland. They are essentially a littoral people, able to obtain sustenance only from the sea. The E. closely resemble each other over the whole area occupied by them in appearance, language, habits, traditions, &c., and there is perhaps no other nation so unmixed in blood. Their faces are of a broad oval shape, the forehead and chin recede, the nose is usually broad and depressed, but in some instances prominent like that of Europeans. The eyes are small and oblique, and the complexion is nearly white after the removal of the permanent coating of oil, dirt, and smoke which covers the face. The usual height is from 5 feet to 5 feet 10 inches, and in rare instances to about 6 feet, and both men and women are remarkably muscular and agile. Dr Latham ranks them among the American Mongolidæ, under which designation he includes all the native races of the New World. Dr Rink, the most recent and probably the most authoritative writer on the origin and history of the E., asserts that the independent existence of this people dates from a very remote period—many of their traditions being much more than one thousand years old—and inclines to the belief that the immediate cradle of the race was the American and not the Asiatic continent. His theory is that this people, originally located on the great rivers of polar N. America, were driven northward to the coast and to the islands beyond by Indians from the south, between whom and the E. a traditional enmity subsists to the present day. The E. depend for their existence on the seals and cetaceous animals which they capture at breathing-holes in the ice or at its edge. The blubber of these animals is their usual food, and enables them to resist the extreme cold of the regions they inhabit, while the skins of the seal, &c., are made into suitable and sufficient clothing. The imperative necessity of capturing these animals in order to preserve life has moulded the character of the social life, defined the nature of the inventions, and affected, if not created, the religion, the superstitions, and the amusements of this people. Their *kayak*, or shuttle-shaped boat, in which they hunt the walrus and whale, is a framework of wood joined together chiefly by strings, covered with skins, and impenetrable to water. Nothing could be more admirably adapted for its purpose, yet it would be difficult to find any sea-going boat anything at all like it in any other part of the globe. Their harpoons are fitted with an inflated bladder, which serves the double purpose of retarding the retreat of the wounded animal and floating the harpoon should it escape. The points of the harpoons and spears are so fitted into the shafts that after the blow has been delivered the point and the shaft come apart. The shafts of these weapons in most cases consist of small pieces of bone neatly tied together with thongs, and the points are supplied by the unicorn of the narwhal, by sharp-pointed bones, teeth, and occasionally metal, of the value of which the E. have the liveliest appreciation. The dog-sledges, marvels of construction, are also, for the most part, formed of pieces of bone tied together. Grouped together in small tribes of six to twelve or more families, the E. regard their wintering quarters as their home; in summer, however, they are constantly travelling, and choose their route usually with the view of hunting reindeer, though seal-hunting, fishing, and trade are objects always kept in mind. When the cold weather comes round, the party return to their wintering-place, and recommence sealing and whaling for the season. They often eat flesh and fish raw, but the usual custom is to boil it in a stone pot suspended over a lamp fed with blubber, and with moss for wicks. The costume is nearly the same for both sexes, consisting of fur or sealskin jacket, with hood, trousers of the same material, and boots reaching well up the thigh. In summer they reside in tents formed of hides sewn together, but in winter they retire into houses variously constructed, as the capabilities of the locality permit—of stones and turf, stones and bones, driftwood, or blocks of frozen snow, so cut and arranged the one above the other as to form a vault or dome. Owing to the uncleanly habits of the people, and to the circumstance that their food is often in a putrid condition, the stench of these houses is unsupportable to white men, though some of our early explorers passed whole nights in them. The religion of the E. is a form of paganism, the system embracing a supreme being named *Tornarsuk*, a series of guardian spirits named *tornat*, and a class of human beings (*angakut*) endowed with supernatural wisdom or power. Existence the E. accept as a fact without speculating on the origin of man. Their invisible world embraces the *upper world*, the unlucky souls in which suffer from constant cold and famine; and the *under world*, in which the temperature is warm, and the food abundant. The E. are firm believers in witchcraft of a most complicated description. The tales and traditions of this singular people are divided into two classes, the ancient and the modern, the former of which—recounting extraordinary adventures, under conditions, however, precisely the same as those under which the E. of the present day live—are believed to be much more than a thousand years old. These tales form a body of unwritten literature, handed down orally, but with scrupulous exactness, from generation to generation. Story-telling is cultivated as a science, and the art of the *raconteur* is subjected to such a severe standard in the matter of accuracy, that the tales are supposed to have been preserved in an unaltered shape for ages. They concern themselves chiefly with deeds of violence terribly avenged, and the usual moral enforced is to be kind to orphans and to the defenceless, if we would avoid the surely coming day of reckoning. Of the entire race, the number of which is not ascertained, those that have come directly under European influence are chiefly the inhabitants of the Danish districts in Greeenland. During the last century these were rapidly decreasing; but after the Moravian mission established here by Hans Egede in 1721 had taken firm root, the decrease was arrested, and in time the numbers began to increase. For some time subsequent to 1855 the numbers of E. in the Danish districts remained almost stationary between 9400 and 9700. The Danish officials have never introduced intoxicating liquors into Greenland, and scarcely another instance can be adduced in

which Europeans have shown equal consideration for an aboriginal race. See Richardson's *Polar Regions*, and Dr Henry Rink's *Tales and Traditions of the Eskimo* (Edinb. 1875).

Es'ki-Zaghra, a town in the vilayet of Adrianople, European Turkey, 67 miles N.W. of Adrianople, with manufactures of carpets, &c., has thirteen mosques, four Christian churches, and a huge bazaar. Its baths are much frequented. Pop. 13,250.

Es'la, a tributary of the Douro, rises in the Cantabrian mountains, province of Leon, Spain, and after a S.W. course of 130 miles, falls into the Douro, 15 miles below Zamora. In the angle at the confluence of the Douro and E. is found the finest clay in the Peninsula for the manufacture of earthenware.

Esmerel'da (Span. 'emerald'), a river of Ecuador, S. America, rises near Quito, passes the town Esmerelda (pop. 4000), and enters the Pacific after a course of 110 miles.—E. is also the name of a mountain range of Brazil, province of Minas Geraes, about 170 miles long, and of a county in Nevada bordering on California, and rich in minerals.

Es'neh, or **Es'ne**, a town in Upper Egypt on the left bank of the Nile, about 80 miles N. of Assouan. It has some manufactures of cotton and earthenware, and a pop. of 4000, of whom 1500 are Copts. At E. are the ruins of a sandstone temple founded by Thothmes III., and dedicated to Chnumis Satis and Har-Hek.

Eso'cidæ, a family of Teleostean fishes, represented by the Pikes. It belongs to the *Malacopteri* ('soft-finned') section of the Teleostei, and to the Abdominalian section of the *Malacopteri*. The dorsal fin is placed far back on the body, and the intermaxillary bones partly contribute to the formation of the upper jaw.

Esoter'ic (Gr. *esôterikos*, 'inner'), in the ancient mysteries and schools of philosophy, was applied to the doctrines taught in private, and designed for the initiated alone. Those taught to the public were termed *exoteric*. In general the former denotes the secret or abstruse, the latter the public or popular.

Espal'ier (Fr. from Ital. *spalliere*), a supporting lattice-work of wood or wire-fencing on which fruit-trees, &c., are trained, and the objects gained by the use of which are economy of space, favourable exposure to heat, light, and air, and considerable protection against the effects of high winds. The British fruit-trees most suitable for training by means of the E. are the apple and pear.

Esparte'ro, Don Jo'aquin Baldome'ro, a Spanish general and politician, the son of a cartwright, was born at Granotula, La Mancha, 27th February 1792. He was intended for the Church, but on the French invading Spain in 1808, joined the *Batallon Sagrado* ('the sacred battalion') formed wholly of students, and, on the expulsion of the French, fought in S. America against the insurgent colonies. On his return to Spain he espoused the cause of Isabella II., drove Don Carlos from the country in 1839, for which he was made a grandee and duke, and from 1841 to 1843 governed as regent with considerable success, though often foiled by intrigues. In 1843 the party of progress and the party of Queen Christina united against him. General Narvaez entered Madrid, and E., deserted by his troops, betook himself to England, where he remained until 1848. He lived in retirement in Spain from 1848 to 1854, when Queen Isabella unwillingly summoned him to form a ministry along with General O'Donnell. Soon two parties arose—the Liberals, followers of E., and the opponents of progress, headed by O'Donnell—the antagonism between which became so bitter as to completely cramp the government. In 1856 E. was dismissed, and immediately rebellions in his favour broke out at Madrid, Barcelona, and Saragossa, but from these he held aloof, resigning the senatorial rank in 1857. In 1868 he showed warm sympathy for the provisional government, and in 1869 it was proposed by one of the deputies that he should be made king, a scheme which the Cortes did not favour. In 1875 he avowed his adherence to Alfonso XII. He died at Logroño, 9th January 1879. E. proved himself a good soldier, and one of the most honest, patriotic, and disinterested of Spanish politicians, but wanted the decision, wariness, and dexterity indispensable to successful Spanish statesmen. See *E., Historia de su Vida Militar y Politica*, by Florez (Madrid, 1843-44).

Espar'to (*Macrochloa*, or *Stipa*, *tenacissima*), a well-known genus of Grasses, grown in large quantities in Spain and Northern Africa, whence it is exported for the manufacture of mats, baskets, ropes, paper, &c.

Es'pinasse, or **Lespinasse, Claire-Françoise**, famous for her powers of fascination, intellectual brilliance, and shifting fervours of sentiment, was born at Lyon in 1731 or 1733. She was the illegitimate child of Madame d'Albon, and after acting as governess in a noble's household, went to Paris as a companion to Madame du Deffand, to whom she was at first strongly attached, but whom she soon eclipsed by her youthful beauty and wit. A quarrel ensued, and Mademoiselle E. separated from Madame du Deffand, most of whose admirers, D'Alembert among others, forsook her for her more captivating rival. Her friends then obtained Mademoiselle E. a pension from the king, and she continued until her death, at Paris, May 23, 1776, to charm the most cultivated circles of her time. D'Alembert was deeply enamoured of her. Her letters show her to have possessed a warm heart, as well as dazzling wit and exquisite accomplishments. See her *Lettres* (Par. 1806), Sainte Beuve's *Causeries du Lundi*, tom. ii., and Jules Janin's *Introduction à une Édition des Lettres de Lespinasse*.

Es'pinel, Vicente, a Spanish poet, born at Ronda, in Grenada, 28th December 1551. He studied at Salamanca, entered the army, fought in Flanders, and travelled through France, Italy, and Spain. He afterwards took holy orders, obtained some preferment, and ended his life in a monastery at Madrid in 1634. E. was a musician of considerable fame, and added the fifth string to the guitar. He probably invented the stanza of ten octosyllabic verses called *Espinelas*. His works are *Vida y Aventuras del Escudero Marcos de Obregon*, which somewhat resembles *Gil Blas*; *Casa de las Memorias*, a poem; a translation of Horace's *Ars Poetica*, and various lyrics and biographies. See Langston's English translation (1816) of *Marcos de Obregon*, and Tieck's preface to his German translation of E. (1827).

Espinha'ço, Serra do, a mountain chain in Brazil, running parallel to the coast, generally about 150 miles from it, though its offsets in places approach within 20 miles of it. It rises N. of Ouro Preto, and extends northward to the banks of the San Francisco. Its southern portion is the highest, but no summit rises above 6000 feet.

Espir'ito San'to (Port. 'Holy Spirit')—1. A maritime province of Brazil to the N. of Rio Janeiro, has an area of 17,030 sq. miles, and a pop. (1872) of 82,137, of whom 22,659 are slaves. It is watered by the Rio Doce, and is in great part covered with forests, in which are found valuable woods and drugs. The coast flats yield sugar, cotton, manioc, and rice. The capital is Vittoria. 2. A town of Cuba, near the centre of the island, 240 miles E.S.E. of Havana. Pop. 10,000. 3. The largest island of the New Hebrides, 65 miles by 20, and rising some 2000 feet above the sea.

Es'planade (Fr. from Lat. *ex* 'out,' and *planus*, 'flat'), in fortification, is an open space of ground extending in front of the glacis of a fortified work, such as intervenes between the citadel and the houses of every fortified town, and the object of which is to make certain that in the event of siege no cover shall be afforded to the enemy. The term is also applied to open spaces for walks and drives, into which the fortified works of former days are now so frequently converted.

Es'py, James P., an American meteorologist, was born in Pennsylvania about 1785. In his early life he was a successful teacher in Philadelphia, but becoming devoted to the study of meteorology, he left the profession of teaching and supported himself by lecturing, for which the United States presents peculiar facilities. He delivered a series of lectures to the Franklin Institute of Pennsylvania, and rendered himself famous by his theory of storms. He received the Magellanic premium of the American Philosophical Society of Philadelphia in 1836 for a treatise on storms. His numerous lectures on this subject gained him the name of the Storm-king. In 1841 he published his book upon the *Philosophy of Storms*, a work which received the highest commendation. In the Smithsonian Institution at Washington he made his important experiments upon the cooling of gases, and the cooling effects of expansion on dry and moist air. E. made several able reports on meteorology to the United States Government, the last being printed in 1857. His

ardour and enthusiasm did much to advance this science to the prominent place it holds in America. E. died in Cincinnati, January 24, 1860.

Esquire', or **Écuyer** (Old Fr. *escuyer*, 'a shield-bearer,' from *escut*, Lat. *scutum*, 'a shield'), literally a man who carries a knight's shield. The E. in chivalry was the stage into which the page, *damoiseau* or varlet, passed at the age of fourteen. The next seven years were spent in athletics, running at the ring, tilting, and mock combats, and in attendance on a particular knight. On entering the temple of honour, the E. became a knight or chevalier. E. was the first degree of 'grand chivalry,' to which, as a general rule, only persons of noble birth were admitted; but sometimes chevaliers were created without passing through the stage of E. The squire was responsible for the state of the knight's armour, a most important matter in close fighting with pointed weapons. The dress of an E. was properly a modest brown; but the garment of Chaucer's E. was embroidered like a meadow. Many gentlemen of good birth did not become knights on account of poverty. (See CHIVALRY.) In English law E. is apparently a title not of dignity, but merely of *worship*, colonels, serjeants-at-law, and doctors of the learned professions being placed before esquires. There are five sorts of esquires—(1) Eldest sons of knights and their eldest sons in perpetual succession; (2) eldest sons of younger sons of peers, and their eldest sons in perpetual succession; (3) those created by letters patent, and their eldest sons: this investiture was *calcaribus argentatis* (silver spurs), in distinction from the *equites aurati*, who had gilt spurs; (4) esquires by office, who are named so in commission from the crown; (5) all foreign peers, and the E. whom it is in the power of a Knight of the Bath to constitute on his installation. Even eldest sons of peers (though often titular lords) are legally described simply as E.

Esquirol, Jean Étienne Dominique, a French physician, famous for his treatment of the insane, was born at Toulouse, January 4, 1772. He studied medicine in Paris, giving special attention to insanity, and in 1799 founded an institution for the mentally deranged. In 1811 he was elected successor to Pinel at the Salpêtrière, where he introduced an entirely novel treatment of maniacs, substituting kindness for constraint. He was made inspector-general of the university in 1823, and in 1826 chief physician to the Private Lunatic Asylum at Charenton. He died December 12, 1840. Through his philanthropic labours and scientific attainments the old coercive and cruel treatment of the insane was abolished, and the present humane system introduced. E.'s chief work, *Des Maladies Mentales considérées sous les Rapports Médical, Hygiénique et Médico-légal* (Par. 1838), is of great value.

Esquiros, Henri Alphonse, a French author, was born at Paris in 1814. His first work, *Les Hirondelles*, appeared in 1834, and won the praise of Victor Hugo. He published *Les Magiciens*, a phantasy, three years later, and the romance of *Charlotte Corday* in 1840. In that year also he produced three works of great power—*Les Vierges Martyres*, *Les Vierges Folles*, and *Les Vierges Sages*. In 1841, E. was imprisoned in the Pélagie for supporting the views of Lammenais, when he wrote *Les Chants d'un Prisonnier*. In 1847 he published *L'Histoire des Montagnards*, and *Paris*, being papers on 19th c. life, reprinted from the *Revue des Deux Mondes*. E. became member of the Legislative Assembly in 1848; but after the *coup-d'état*, was exiled for his opposition to the Empire. In 1855 he came to England, and his *English at Home* was published at London in 1862 and 1863. His *Dutch at Home* was published by Chapman & Hall in 1861. In 1869, E. was returned to the *Corps Législatif*, and became prefect of a department. In 1870, however, he retired, and assumed the editorship of the *Égalité* at Marseilles. He died at Paris, 13th May 1876.

Ess'bouquet, an abbreviation of essence of bouquet, is a compound perfume of English origin and well established reputation. Like most bouquets, it is of complex composition, containing orange, citron, petit-grain, lavender, clove, and cassia oil, tincture of musk, and a minute quantity of otto of rose, besides other essences.

Ess'en, an ancient town of Rhenish Prussia, on the Börne, 20 miles N.E of Düsseldorf by railway, in a district rich in coal and iron. It has a cathedral, the west choir of which dates from the 9th c., and which was renewed in 1855. In 1871 the sixty-five mines in the circle of E. produced 19,588,877 tons of coal, and ten mines produced 512,268 tons of iron ore. E. is the seat of the famous cast-steel works of Herr Krupp, which employed (1875) 15,000 hands, and cover 1800 English acres, of which one-fifth is roofed over. In 1872, the production of 125,000 tons of cast steel in these works consumed 500,000 tons of coal, 125,000 tons of coke, 3,500,000 cubic feet of water, and 176,585,000 cubic feet of gas. The establishment is very complete, having 23 miles of rails for locomotives, and 9 miles for horse-waggons, a telegraph system, with eighty stations, a fire-brigade, a hotel, beer-shops, a bakery, printing-presses, &c. Pop. (1871) 51,513.

Essences are solutions of volatile essential oils in alcohol, and are prepared—(1) by adding a rectified spirit to the odoriferous parts of the plant and distilling; (2) by adding the spirit to the previously-extracted oil and distilling; or (3) by adding the oil to the spirit and agitating till a uniform mixture is obtained. Innumerable simple and compound E. may thus be prepared. Alcoholic solutions, as of camphor, are sometimes called E. In the pharmacopœia E. and spirits are identical in preparation, but the former contain 1 part of the oil to 4 of the spirit, and the latter 1 to 49.

Essenes'. Countless derivations of the name have been given, making them 'the healers,' 'the holy,' 'the faithful to God,' 'the mysteriously silent,' 'the watchers,' 'the seers,' 'the agents,' 'the baptists,' 'the pious.' The greatest English authority, Ginsburg, who enumerates nineteen, prefers the last (Heb. *Chassiya*, 'pious'), which connects the name with *Chassidim*. The E. were a Jewish sect, or rather a branch of the sect of the Pharisees. They represented the direct and legitimate development of Judaism in a strict application of the demands of the law as understood from the time of Ezra. Being, like the Pharisees, the descendants of the Chassidim (q. v.) or Puritans, the E. were the ultra-Puritans, while the Pharisees were the moderate party; or the E. were to the Pharisees what the latter were to the general community. Thus in the Mishna, Talmud, and Midrashim, they are called the original Assideans, *i.e.*, Chassidim. If this be the correct theory of their origin, it is impossible to say at what date they could have been regarded as distinct from the general body of the Jews. They are first mentioned as a distinct sect in the time of Jonathan the Maccabæan, about B.C. 160 (Josephus, *Antiquities*, xiii. 5, 9). At first they lived in the general community, especially in Jerusalem, which had a gate named after them. From Jerusalem they retired to the smaller towns and villages, and from these to the deserts, in order to avoid the habitual wickedness of citizens, but also and chiefly because, according to their observance of the Levitical laws of purity, they considered themselves defiled by coming in contact with those who did not live according to the same rules. The majority settled on the N.W. shore of the Dead Sea, and the rest lived in scattered communities throughout Palestine and Syria. According to Josephus they numbered 4000. After A.D. 40 little is heard of them. Probably most of them became Christians. The most marked points of difference between them and the Pharisees were that they (1) formed an isolated brotherhood; (2) held celibacy to be a higher life; (3) did not go to the temple, nor offer sacrifices; and (4) did not believe in a resurrection of the body, though holding the immortality of the soul. Many of the precepts and practices of Essenism reappear in Christianity; but that the former led the way to the latter by expecting a Messiah and proclaiming the kingdom of heaven is incorrect, because the E. regarded these as enclosed within their own limits.

The principal doctrines and practices of the E. which have passed into the Christian system are the following:—To seek first the kingdom of God and his righteousness (cf. Matt. vi. 33, Luke xii. 31); to seek to have no treasure upon earth, the supply of one's wants with contentment being enough, and the greatest riches, Matt. vi. 11, 19-21, 25-34; community of goods, the rich selling their property, and a steward keeping a common bag for the benefit of all, Matt. xix. 21, Luke xii. 33, John xii. 6, xiii. 29, Acts ii. 44, 45, iv. 32-35; all were on a perfect equality, Matt. xx. 25-28, xxiii. 8-12, Mark ix. 35-37, x. 42-45; to be meek and lowly in heart, poor in spirit, merciful, pure in heart, peacemakers, to hunger and thirst after righteousness, Matt. v. 1-9, xi. 29; the healing of the body to be combined with that of the

soul, as by Christ the power to exorcise demons, to perform miraculous cures, &c., was given to the faithful, Matt. x. 8, Mark xvi. 17, Luke ix. 1, 2, x. 9; that oaths should never be used, Matt. v. 33–37; to take nothing with them on a journey, Matt. x. 9, 10, Mark vi. 8–10; to make no weapons of war, Matt. xxvi. 52, only weapons might be carried on a journey for defence against robbers, Luke xxii. 36; that celibacy was a higher kind of life than matrimony, although some among them had wives, Matt. xix. 10–12, 1 Cor. vii. 32–35; not to offer animal sacrifices, but their own bodies, Rom. xii. 1; to live such a life of purity as to be temples of the Holy Ghost and be able to prophesy, 1 Cor. vi. 19, xiv. 1, 39; a threefold rule for the conduct of their life—love of God, of virtue, of mankind, Matt. xxii. 36–40; to despise philosophy except in so far as it treated of the existence of God, Col. ii. 8; a supreme love for the members of the brotherhood, Rom. xiii. 8, 1 Tim. iv. 9, 1 Peter i. 22, ii. 17, 1 John iii. 14, iv. 7, 11, v. 2.

As the majority lived in celibacy, the brotherhood had to be kept up by proselytes. The best material for these of course was children, whom they preferred. Grown-up candidates had to pass through a noviciate of two stages extending over three years, attaining in succession seven different degrees of purity or holiness: (1) outward or bodily purity by baptisms; (2) celibacy; (3) inward or spiritual purity; (4) the possession of a meek and lowly spirit; (5) being a temple of the Holy Spirit and able to prophesy; (6) being able to perform miraculous cures and raise the dead; (7) being like Elias, the forerunner of the Messiah. Our Saviour described John Baptist as having attained the highest degree of Essene purity (Matt. xi. 14); and as much of the Sermon on the Mount is expressed in Essene phraseology, and still more is in accordance with its spirit, it has been thought probable that Christ himself may have in his youth been instructed by members of the sect. The original authorities on the subject are Josephus, Philo, and Pliny. The first to show the true relations of the E. to allied sects was Frankel (*Zeitschrift für die rel. Inter. des Jud.*, 1846, and *Monatschrift für Gesch. und Wissen. des Jud.*). See also Ewald's *Geschichte des Volkes Israel* (3d ed. Gött. 1869); Keim's *Geschichte Jesus von Nazara* (Eng. trans. 1873); and Ginsburg's *Essay on the E.* (1864).

Essen'tial Oils, or **Ethe'real Oils**, are substances which in their chemical constitution and properties differ entirely from common or fixed oils; but they are closely allied to resins, into which, through oleo-resins, they insensibly merge. At ordinary temperatures they are for the most part fluid, and such as are solid melt readily without decomposition, and they also undergo distillation without change. They possess a burning taste and a powerful odour, which in some is very pleasant, while in others it is equally repulsive. Their smell is due to the fact that the gaseous particles they evolve are very energetically acted on by oxygen. Some are pure hydro-carbons (*i.e.*, compounds of carbon and hydrogen), others contain oxygen in addition, and in the malodorous series sulphur is also present. Under the influence of cold many of them separate into two distinct bodies, a solid crystalline stearoptene and a fluid elaoptene. E. O. are very sparingly soluble in water, but dissolve freely in alcohol, ether, bisulphide of carbon, chloroform, and the fixed oils. Such of them as possess a pleasant odour are extensively employed in perfumery, others are largely used for flavouring articles of food, others are valued in medicine, and a few are employed in the arts as solvents, &c. The following is a list of the principal E. O.:—Orange, neroli, bergamot, lemon, lime, petit-grain, bitter almond, lavender, peppermint, mint, rosemary, marjoram, thyme, carraway, anise, sweet fennel, cajuput, sassafras, cinnamon, cassia, clove, pimento, nutmeg, sandalwood, rosewood (*Convolvulus scoparius*), geranium, winter-green, patchouli, vetiver, citronelle (species of *andropogon*), cedarwood or juniper, and Calamus aromaticus.

Essequi'bo, a river of British Guiana, S. America, rises in the Sierra-Acaray, flows in a direction almost always due N. through impenetrable forests, and enters the Atlantic after a course of upwards of 550 miles, broken by numerous cataracts. Its mouth forms an estuary 20 miles wide. Small schooners can proceed nearly 50 miles up the river.

Ess'ex, a county in the S.E. of England, bounded N. by Suffolk and Cambridge, W. by Hertford and Middlesex, S. by the estuary of the Thames, and E. by the German Ocean. Area, 1648 sq. miles; pop. (1871) 466,436. E. is well watered by tributaries of the Thames, as well as by the Crouch, Chelmer, and Colne. The surface, which in the N. and in the centre is richly wooded, and on the coast partly sandy and partly marshy, nowhere reaches a great elevation. The highest point is Langdon hill, 620 feet above the sea-level. In 1875 there were under corn crops 423,684 acres, principally wheat, barley, and beans; under green crops 110,501 acres, principally mangold-wurzel, turnips, and potatoes; clover, grasses, &c., in rotation, 72,588 acres; and permanent pasture 179,374 acres. In the neighbourhood of London, chemicals, tar, &c., are manufactured. The Thames Ironwork and Shipbuilding Company, near the new Victoria Docks, is in E. There are silk-mills at Colchester, Braintree, Halstead, &c. Straw-plaiting employs numerous hands in the villages, and there are cement and whiting manufactories, iron-foundries, and brickworks. Oyster-fishing was long a profitable industry. Calves and lambs are raised in large numbers for London, and the county is famous for its breed of pigs. The Reform Act of 1867 gave E. six parliamentary representatives. In the time of the Romans this part of the island was occupied by the Trinobantes, and was included in the Roman province *Flavia Cæsariensis*. It was the nucleus of one of the kingdoms founded by the Low German invaders of Britain, from whom it received its present name of an E. or 'East-Saxon' land.

Essex, Earl of. See CROMWELL, THOMAS.

Essex, Robert Devereux, Second Earl of, son of Walter Devereux, first Earl, was born at Netherwood in Herefordshire, November 10, 1567, studied at Cambridge, was introduced at court by Burleigh in 1584, and gained the favour of Elizabeth. In 1584 he accompanied the Earl of Leicester in his expedition to Holland, and showed great bravery in the battle of Zutphen. On the death of Leicester, E. succeeded to his place in the Queen's affections, and honours were showered upon him. He commanded two expeditions against Spain, in the latter of which Cadiz was captured, and was made Earl Marshal of England and Chancellor of Cambridge University. At the same time he acquired a high reputation beyond the limits of the court by his generous patronage of men of letters and science, such as Shakespeare and Bacon. But popularity turned his head. He offended the Queen by rudeness. In spite of this he was appointed (1599) Lord Lieutenant of Ireland when the larger portion of that island was in rebellion. He failed, however, to allay the disorders, and was recalled. Returning to London, E. madly put himself at the head of an insurrection, was imprisoned, and after a trial, for his share in which Bacon (q. v.) has incurred deserved obloquy, was condemned to death. His execution took place February 25, 1601.—**Robert Devereux, Third Earl of E.**, son of the preceding, was born at Essex House in 1592, studied at Eton and Oxford, and in his earlier years took service under the Elector Palatine and the United Provinces. He was not a favourite with King James or with his son Charles, and soon after the outbreak of the Civil War was appointed general of the Parliamentary forces. He commanded at Edgehill (1642), took Reading (1643), compelled the King to raise the siege of Gloucester (1643), but was unfortunate in a campaign in Cornwall, and escaped with difficulty to London. He was received with honour by the Parliament, but ill-health and the growing power of the Independents (E. was a moderate Presbyterian) induced him to withdraw from public affairs. He died 14th September 1646. See Green's *Short History of the English People* (1875).

Ess'ling, a village of Austria, 5 miles E. of Vienna, together with Aspern (q. v.) the site of a fierce but indecisive battle between Napoleon and the Austrians, May 21–22, 1809. From it Massena got his title of 'Prince of E.'

Ess'lingen, a walled town of Würtemberg, on the Neckar, 9 miles E.S.E. of Stuttgart by railway. It has a fine Gothic *Frauenkirche* (14th c.), with a spire 230 feet high, an old castle, a rare old townhouse (1430), a well-endowed hospital, and extensive manufactures of machinery, cottons, woollens, paper, silver ware, and wines. E. is specially celebrated for its locomotive engines and its 'champagne,' a sparkling Neckar wine. Pop. (1871) 17,941. E., founded in the 8th c., was made a free city of the German Empire under Otto IV. in 1209. The Swabian Bund was formed here in 1488. A school for knights existed till 1733 at E., which was the scene of many tournaments.

The town suffered severely in the Thirty Years' War. It came to Würtemberg by the peace of Lunéville in 1802.

Essoign' (Fr. *ensoigne*, *essoin*, from *soin*, 'care,' 'labour'), in English law, an excuse on ground of sickness or other sufficient cause for non-appearance by one called in an action. *E. day of term* is the first day of the term on which the courts are open, essoigns or excuses being then, according to ancient custom, heard for those who have not appeared according to the summons. In Scotch law the form is *Essonium* or *Essonzie*.

Ess'ouan, or Es'wan. See ASSOUAN.

Estab'lished Church is a Church recognised and supported by the state. The relation in which the Church may be said to stand to the state depends on the definition of the nature of the Church. The form of the Christian Church was—(1) The little community at Jerusalem. (2) As soon, however, as another such community was formed elsewhere, and one member of the Church was dead, a new idea was formed of the Church as a spiritual body, bounded by no limits of space or time, but composed of those (and none else) of whom it is written, 'As many as are led by the Spirit of God, they are the sons of God.' In process of time the theory came to be developed (3) that the Church is essentially an externally organised society, all those born within its pale being its members, and entitled to all its privileges—its sacraments and ordinances—in virtue not of their character but of their birthright. It is in this sense only—in which baptized persons are everywhere claimed as Christians—that there can properly be a *national* E. C. Before the Reformation nations were held by the Church to be Christian as nations, and with the development of the Popedom the Church became not only national but Catholic. After the Reformation Protestant Churches which kept the doctrine of baptismal regeneration could properly enough maintain their national character, the headship being vested in the sovereign instead of the Pope. It thus appears that it is an impropriety to speak of an alliance between a national Church and the state, because they are identical. Owing, however, to the growth of dissent in modern times, it is customary to speak of the relation existing between the Church and the state as an alliance; and the arguments for and against such a relation existing may be here briefly stated. The controversy is carried on both on the ground of *divine authority* and on that of *utility*. 1. *Divine authority.*—It is contended that the teaching of Scripture is in favour of a national E. C. both as to the principle and as to its application. (1) As to the principle, Scripture teaches that Jesus Christ is the supreme king over all kings and rulers, and head not only of his Church but of all nations: Ps. ii. 12 (applied to Christ, Acts xiii. 33); lxxii.; cx.; Eph. i. 21, 22; Rev. *passim*. (2) As to the application—(*a*) in Melchizedec the offices of priest and king were united (the closest conceivable union of Church and state), in respect of which he was a type of Christ (Heb. vii. 1. 2); and further, Abraham's paying tithes to Melchizedec was a type of the rights of the priesthood of Christ (Heb. vii.). (*b*) The Mosaic ordinances for the payment of tithes to the priests amounted to a national establishment and endowment of the Church. It is held on this side to be no valid objection that the Jewish system was a pure theocracy, because it was founded on principles of moral obligation which are applicable in all time. (*c*) In reference to the Gospel dispensation, it is contended that 'when the ordinance of God in behalf of kings and other rulers (as in Rom. xiii. 1, 2; 1 Tim. ii. 1, 2; 1 Pet. ii. 13–15) was so explicitly renewed, if it had been intended to impose any new and peculiar restriction upon their authority, it is impossible to suppose that it would not have been made known. The objections and arguments on the other side under this head are in brief as follows:—(1) 'That there is no precept of the gospel under which an E. C. is required and enjoined, and that there was no such institution during the first three centuries.' (2) 'That Christ himself declared that his kingdom is not of this world: John xviii. 36.' (3) 'That a civil government is not competent to specify what ought to be the nation's creed, and cannot therefore be supposed to have divine authority to do so.' (4) 'That the maintenance of any particular system of religion at the public expense, and consequently more or less at the expense of dissenters, is anti-scriptural, unjust, and a violation of the rights of conscience.' 2. On the ground of *utility* it is argued, on the one hand—(1) That an E. C. is necessary for keeping up a supply of ministers and religious ordinances proportioned to the spiritual wants of the people; and asserted that the voluntary system, when it has been tried, has signally failed in giving such a supply in poor and thinly-inhabited parts. (2) That there are great advantages in the ministers of religion being independent of those to whom they minister, because when dependent on them they are under a temptation to accommodate their ministrations to the wishes rather than to the wants of men. (3) That an E. C. not only promotes religion generally, and thus strikes at the root of all crime, but tends to consecrate the state itself and the rulers of the state. On the other hand it is argued—(1) That ministers being independent of their flocks tends to make them indolent and indifferent in the discharge of their duty, and that the organisation of an E. C. leaves little room for burning zeal and intense vitality. (2) That 'civil legislation ought not to extend beyond the outward secular affairs of communities,' and that the best thing the state can do for religion is 'to let it alone,' because all the good done by an E. C. can be done better on the voluntary principle. (3) That although it was impossible for the state to let religion alone at the time when National Churches were established (because it was then the universal conviction that it was the duty of rulers to care for the religious condition of their subjects, because religion was then too formidable a power to be let alone, and because such a course would then have entailed great spiritual destitution), Established Churches are now an anachronism. See Hooker's *Eccl. Polity*, Dr M'Crie's *Statement of the Difference*, &c. (1807), Dr Arnold's *Fragment on the Church*, Dr Inglis' *Vindication of Eccl. Establishments* (1833), Dean Stanley's *Essays* (1870), H. B. Wilson in *Essays and Reviews* (1860), *Ecclesia* (1870), J. Baldwin Brown's *First Principles of Eccl. Truth* (1871).

Estate', in English and Scotch law, has the same signification as property. In England, property is either real or personal. Real property consists of lands, tenements, and things immovable. Personal property, or personality, consists of money, goods, leases, and other movables which either are or easily may become transferable. Nearly all the real property of England is supposed to have been granted by a superior, from whom it is held in consideration of certain services to be rendered to him by the possessor. By the 12 Car. II. c. 24, which abolished the military tenures, commuting them for a grant of excise and customs, only the honorary services of grand sergeantry are reserved, such as carrying the king's sword or banner, or officiating as butler or carver at the coronation. Real property, by the law of England, can only be acquired in two ways, by Descent (q. v.) and by purchase. See PURCHASE OF ESTATES, ENTAIL; see also HEREDITAMENT, MANOR. In personality, see CHATTELS. Regarding tenures of real E., see BOROUGH ENGLISH, BURGAGE, COPYHOLD, COMMON TENANCY, FREEHOLD E., GAVELKIND, SOCAGE. See also, applicable to real and personal E., JOINT TENANCY. Respecting transfer of land, see REGISTRATION OF TITLE TO LAND. In Scotch law, see HERITABLE AND MOVABLE, MOVABLES.

Estates of the Kingdom are three in number, the Lords Spiritual, the Lords Temporal, and the Commons. In the ancient Parliament of Scotland the three estates of the realm were, according to Erskine, 1st, the archbishops, bishops, abbots, and mitred priors; 2d, the barons, including commissioners of shires and stewartries; and 3d, the commissioners from royal burghs.

Es'te (anc. *Ateste*), a town in the province of Padua, N. Italy, at the foot of the Euganean Hills, 18 miles S.W. of Padua. It was a Roman colony, was a place of importance under the Empire, and still contains numerous ancient inscriptions. The *Rocca* or Castle of E. overshadows the town, and the church of San Martino has a leaning campanile. There are manufactures of silks, hats, and pottery. Pop. 8647. The town gives name to the House of E.

Este Family, one of the most princely houses of Italy, famous for the splendid patronage which it accorded to the arts and sciences, traces its origin to some of the Tuscan feudatories of the Karolings. Alberto Azzo II., the founder of the house of E., was invested by the Emperor Heinrich III. with Rovigo, Casal-Maggiore, and other Italian states. His sons, Welf or Guelfo IV. and Fulco I., are the heads of the two great branches of the family—the Welf-Este or German branch, and

the Fulco-Este or Italian branch. Welf IV. was invested with the dukedom of Bavaria by the Emperor Heinrich IV. From him the houses of Brunswick and Hanover, and consequently the later sovereigns of England, draw descent. Fulco I., who died in 1135, is the progenitor of the dukes of Modena and Ferrara. The E. F. headed the Welfic party—the minor principalities and free cities of Northern Italy—in their conflicts with the emperors. It first acquired Ferrara, and later Modena and Reggio: at the same time its successive representatives began to distinguish themselves as lordly patrons of literature and the arts. The Marchese Obizzo (who died 1190) entered into the Lombardic league against Friedrich Barbarossa, but was afterwards confirmed in all his fiefs by the emperor, and raised to the *marchesato* ('marquisate') of Milan and Genoa. By his marriage with Marchesello, daughter of Torello, the head of the Guibellini, the E. F. acquired extensive possessions in Romagna and the March of Ancona. Azzo VII. (died 1264), after a long struggle, inflicted a severe defeat on the Guibellini in 1259, and completely re-established the tottering fortunes of the house of E. Obizzo II., born about 1240, received from the Emperor Rudolf I. the investiture of all the Italian states under imperial suzerainty, and was freely elected to the seignories of Modena and Reggio. Nicolo III. (born 1384, died 1441) re-established at Ferrara the university founded there by his father. Borso, first Duke of Ferrara and Modena, one of the most distinguished princes of his age, encouraged letters and established printing in the Italian states. He died in 1471. Alfonso I. (died 1534) was distinguished as a general and a statesman, and was celebrated in the verses of Ariosto and all contemporary Italian poets. His second wife was the notorious Lucrezia Borgia. Ercole II. (died 1559) and his brother, the Cardinal Hippolito, were liberal patrons of the arts. The latter built the magnificent Villa d'Este at Tivoli. Alfonso II. (died 1597), the most magnificent of contemporary Italian princes, is chiefly remembered for his harsh treatment of Tasso, whom he imprisoned as a madman for seven years. After him the E. F. was represented by a long series of undistinguished princes. Rinaldo, Duke of Modena (died 1737), married Charlotte Felicitas of Brunswick, daughter of the Duke of Hanover, and thus united the two great branches of the E. F., which had remained separate since 1071. Ercole Rinaldo III., who acquired by marriage the principalities of Massa and Carrara, fled to Venice on the approach of the French troops in 1797. He lost Modena and Reggio through the peace of Campo Formio, and died in 1798—the last male representative of the E. F. His daughter, Maria-Beatrice-Ricarda, was married to Ferdinand, the third son of the German emperor, Franz I., who obtained the duchy of Breisgau as indemnity for the lost provinces, and died in 1806. Of their two sons, Francisco IV. acquired the possession of the duchy of Modena. He was succeeded in 1846 by his son Francisco V. (died 20th Nov. 1875), who, as a consequence of the revolution of 1859, lost his territories, and at the consummation of Italian unity in 1860 disappeared from the land in which his ancestors had held the state of kings.

Estell'a (from a Basque root, *ast*, 'a rock'), a city of Spain, province of Navarra, on the Ega, 27 miles S.W. of Pamplona. It has always been a stronghold of the Carlist party, and on the 27th May 1874 was the scene of a fierce and bloody struggle in which the Republicans were defeated. Another battle took place near it, 13th April 1875, in which the Carlists in turn were beaten. There are some woollen and linen manufactures, and a trade in grain and fruit. Pop. 6000.

Este'pa (Basque, 'rocky ground'), a town of Spain, province of Seville, 60 miles E.S.E. of the city of Seville, with manufactures of oil and cloth; a trade in grain, cattle, wool, and fruits, and a pop. of about 7400. The church of Santa Maria is an imposing and well-preserved Gothic structure.

Estepo'na (Basque, 'rocky ground'), a town of Spain, province of Malaga, 23 miles N.N.E. of Gibraltar, supplies the fortress with fruit and vegetables, and has some manufactures of linen and leather. Pop. 9000.

Es'terhazy (originally **Estoras**, then until 1584 **Zerhazy**), **of Galantha**, the name of an Hungarian family. Of the Frakno branch, **Nikolaus I.** in the latter half of the 17th c. worked hard to spread the Lutheran reformation in Hungary.—**Paul IV.**, born 8th September 1635, showed great military skill against the Turks at Essek, Kanisa, &c., in 1664; took several forts, *e.g.*, Segedin and Bartz; and became during the peace governor of the frontier. In the Diet he supported Austrian influence, especially in the declaration of male succession of 1687. He raised the siege of Vienna in 1683, and after many public services became a Prince of the Empire, and received from Charles VI. the right to coin money and to grant patents of nobility. He had refined tastes, and introduced to Hungary the *Atlas Marianus*, or collection of portraits of the Virgin with a history. He died 20th March 1713.—**Nikolaus II.**, born 17th December 1765, was at the head of the Hungarian army of defence raised against the French invasion of the Austrian duchies. Napoleon tried to bribe him by an offer of the Hungarian crown. He was the patron of Haydn, and the founder of a famous picture gallery at Vienna. He died at Como, 28th November 1833.—**Paul Anton**, born 10th March 1786, had a long diplomatic career. He negotiated the marriage of Napoleon and Maria Louise, was minister at London from 1815–18, and from 1830–38. Returning home, he joined the party of Nationalists, and in 1848 was for a time in the Batthyanyi ministry. He died at Regensburg, 21st May 1866.—The present head of the family is **Nikolaus Paul Karl, Prince E.**, born 25th June 1817.

Est'her, Book of, one of the books of the Old Testament, which gives an account of a remarkable deliverance of the Jews in Persia, in the time of a king Ahasuerus (*i.e.*, Xerxes I., 485–464 B.C.), accomplished by his queen, Esther, a Jewess. It has been debated whether the book contains an authentic historical narrative or is a fiction. As opposed to the authenticity, it is held to be improbable (1) that the royal edict for the massacre of the Jews should have been issued and made public, as is necessarily implied, twelve months before the time appointed for its execution; (2) that it should have commanded the massacre of all the Jews in Judæa, which it must have done, since Judæa was at the time a province of the Persian empire, and again inhabited almost entirely by Jews; (3) that the Jews should be able, although permitted by the second edict, in every case to overcome their enemies, and kill 75,000 of them; (4) that the king should send to every province the edict of ch. i. 22; and (5) that Esther should be able so long to conceal her Jewish connection. The strong point relied on as a proof of the authenticity of the book is the existence of the Feast of Purim (q. v.), the name of which is interpreted in the book as the Persian word for *lot* (iii. 7, ix. 24), and which is assumed to imply the events of the book. But this appears to others the strongest proof of its unhistorical nature, since it is the manifest intention of the writer, according to either view, to give the *raison d'être* of the feast. The repeated explanation of *Pur* (iii. 7, ix. 26, 28, 31) is thought to point to this, whereas no Persian word *pur*, 'lot,' is known. In these circumstances the explanation offered is that Pur was a Persian feast, in the celebration of which the Jews had begun to take part here and there (ix. 19), and that the author's aim in writing the work was to bring the feast into general popularity with his countrymen (ix. 20, 27). The language also points to a late period for its composition. See Bleek's *Einl. in d. Heil. Schrift* (3d ed. Berl. 1870; Eng. trans. 1869), and Kuenen's *Religion of Israel* (Eng. trans. 1875).

Estho'nia, or **Rev'al** (native *Viroma*, 'border-land,' Ger. *Esthland*), a government of Russia, and one of the Baltic provinces, is bounded N. by the Gulf of Finnland, E. by St Petersburg, S. by Livonia, and W. by the Baltic. Area, 7610 sq. miles; pop. (1870) 323,961. It is for the most part flat, and one-fourth of the surface is covered with birch and pine forests. The soil is partly sandy, partly marshy, and yields much grain, hemp, flax, and tobacco. Reval is the capital, and the government includes the island of Dagöe. In 1873 there were in the province 528 schools, attended by 32,927 pupils. The upper classes and inhabitants of the towns are chiefly a mixed German, Swedish, and Russian people called *Esthländer*, while the country folks are mainly the aboriginal *Esths* of Finnish race. Ninety-six per cent. of the inhabitants are Lutherans. The language of the Esths, which is mild and melodious, is rich in ballads and folklore. The chief poem in the language is the epic *Kalexa Poig*. See also Neus, *Esthnische Volkslieder* (Reval, 1850–51), and Wiedemann's *Leben d. Esthen* (St Petersb. 1876). Ahrens published an Esthonian grammar in 1853. In the 10th and 12th centuries E. belonged to Denmark, but it was sold to the Knights of Livonia in 1347. It was annexed by the Swedish Erik XIV. in 1561, and was finally seized by Peter the Great in 1710.

Es'toile, in heraldry. See STAR.

Estopp'el (Old Fr. *estouper*, 'to stop'), in English law, is a bar to a right of action arising from a man's own act, the law not allowing a man to speak against his own deed. The same principle is recognised by the law of Scotland under the term *Personal Objection* or *Exception*.

Esto'ver (Fr. *estoffer*, 'to furnish'), in English law, is the right of taking necessary wood from another's estate for household use, to make implements of industry, and to repair hedges and fences.

Estray'. In English law the term is applied to any beast found within a manor or lordship and not owned. If intimation be given by the crier in the two next market-towns, on two market-days, and the E. is not claimed by the owner within a year and a day, it belongs to the lord of the manor. If duly claimed, the owner is entitled to restitution on payment of the expense of maintaining the animal. If legal intimation is not made, the owner is entitled to restitution at any time. If any one not owning the manor on which a beast is E., find and take care of it, the owner may recover it without paying the expenses of maintaining it.

Estreat' (Fr. from Lat. *extractum*), in English law, is a true copy of an original writing, especially applied to a record of a fine entered in the rolls of court. If the condition of a recognisance be broken, the recognisance becomes forfeited; and being *estreated* or extracted from the record and sent to the Exchequer, the fine must be levied by Exchequer process.

Estremadu'ra (Lat. *Extrema Durii*, 'the extreme limits of the Douro'), a province of Portugal, is bounded N. by Beira, E. and S. by Alemtejo, and W. by the Atlantic, and has an area of 6873 sq. miles, and a pop. (1872) of 849,829. It is watered by the Tagus and its tributaries, and is intersected from N.E. to S.W. by the granite range of the Serra da Cintra. These mountains reach to a height of 1800 feet, and terminate, near the mouth of the Tagus, in the Cabo de Roca. To the S.E. the surface is marshy and sterile, but the hill slopes and valleys yield abundance of grain, wine, oil, cork, and fruits, while everywhere there is a profusion of the finest flowers. E. is subject to frequent earthquakes. The chief minerals are coal, granite, and marble.—E. is also the name of a former province of Spain, now divided into Badajos and Caceres. Area, 16,554 sq. miles; pop. (1863) 733,749. It lies between the Portuguese frontier and New Castile, and is intersected from E. to W. by the Tagus and the Guadiana, the basins of which are separated by a sinuous mountain range. The N. and S. portions are also mountainous. The rich botanical and mineral resources of E. are almost entirely neglected, and the only extensive occupation is sheep-rearing. An old right of pasture (*mesta*) has long since put an end to the cultivation of the soil.

Estremoz', a town of Portugal, province of Alemtejo, 25 miles N. by E. of Evora. It is defended by a strong citadel. E. is famous throughout the peninsula for its earthenware, especially of vessels for cooling liquids, which are still cast in purely classical forms. Pop. 6500.

Esz'ek, or **Ess'ek** (Slav. 'high place'), a free town and capital of Slavonia, Austria, on the right bank of the Drave, 12 miles above its confluence with the Danube. It is fortified, and has an important transit trade in grain, wood, iron, wine, and flax, especially since steamers have been placed on the Drave. Pop. (1867) 17,247, mostly Catholics, and of Servian stock. On February 14, 1849, Count Batthyanyi, who for several weeks had held E. for the Hungarian revolutionists, capitulated to Baron Trebersberg, the imperial general.

Étampes, formerly **Estampes**, a town in the department of Seine-et-Oise, France, on a river of the same name, 31 miles S.S.W. of Paris by railway. It is 4 miles long, and has several famous churches which rank among the historical monuments of France, the *Notre Dame* (13th c.), *Saint Basile*, built by King Robert, and a specimen of pure Romanesque, *Saint Martin* (12th c.), &c. There are also remains of an old castle and fortifications. E. has forty flour-mills, besides tanneries, linen, thread, and soap factories, &c. Pop. (1872) 7503. The town existed under the Merwings. It was dismantled by Henri IV. in 1590.

Etang' de Berre, a salt lake in the S. of the department of Bouches-du-Rhone, France; greatest length, 12½ miles, breadth very irregular. Rich saltworks have been erected on its bank, and numerous coasters from the Mediterranean trade to the port of Berre on its S.E. shore.

Etawah (Itawa), the capital of a district of the same name, in the N. W. Province, British India, a mile E. of the left bank of the Jumna, and on the East Indian Railway, 710 miles N.W. of Calcutta and 1835 E. of Delhi. It is an ancient town, with numerous *ghats* or bathing-steps leading down to the river. Its modern prosperity is due to its position on the Jumna and on the road from Agra to Cawnpore. One of the main branches of the Ganges Canal here opens into the Jumna. Pop. (1872) 30,549.—The *district*, which lies in the Doab, between the Ganges and Jumna, has an area of 1691 sq. miles, and a pop. (1872) of 668,641. It yields wheat, barley, and gram in spring, and opium, sugar-cane, cotton, indigo, rice, and millet in autumn. E. was formerly a great haunt of Thugs, or secret and systematic murderers. In a single year (1808) as many as sixty-seven dead bodies were taken out of the wells in the district.

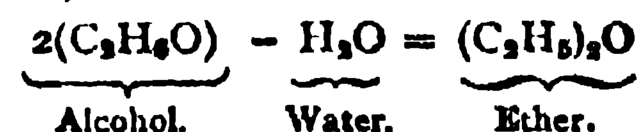
Etch'ing. See ENGRAVING.

Etch'ing on Glass. See GLASS.

Ethel'bert, properly **Æthelberht**, a descendant of Hengest, and son of Ermenric, King of Kent, began to reign in 565. He was defeated in 568 at Wibbandun, Surrey, by Ceawlin of Wessex, but by valour and prudence increased his dominions, and about 590 was acknowledged as *Bretwalda*, his supremacy extending over Middlesex, Essex, and E. Anglia. His wife, Bercta, daughter of Chariberht, King of Paris, being a Christian, Gregory the Great resolved to attempt to convert him and his subjects, and sent Augustine with a band of priests to England. They landed on the Isle of Thanet in 597, and were listened to in the open air by E., who in the next year embraced Christianity. His people followed his example, the language and arts of Rome began to return with the new religion, and England was again brought into contact with the other nations of Europe. In this reign codes of law were published, and the bishopric of Rochester established. E. died in 616. See Bede's *Hist. Eccl. Gentis Angl.* (lib. i.), and Freeman's *Hist. of the Norm. Conq.* (vol. i.).

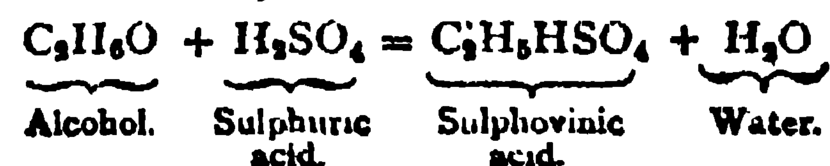
Ethelre'da, properly **Æthelreda**, an East Anglian princess of the 7th c., who was canonised, and whose name was shortened to St Audrey, of which our word *tawdry* is perhaps a corruption, from the gaudy toys and laces sold at a fair held in her honour in the Isle of Ely.

E'ther, also called **Sulphu'ric Ether** and **Ox'ide of E'thyl**, is obtained from spirits of wine by the action of dehydrating agents. To prepare it a capacious retort, either of glass or sheet-iron coated with lead, is connected with a good condensing apparatus. Through the tubulure of the retort a tube passes which is connected with a vessel containing spirits of wine of 0·83 specific gravity. This tube is provided with a stopcock to regulate the flow of spirit into the retort. The retort is charged with a mixture of 5 parts of spirit and 9 parts of oil of vitriol, and heat is applied till E. begins to distil over. The stopcock of the spirit reservoir is then opened, and the spirit allowed to flow into the retort at the same rate as the E. distils over. The level of liquid in the retort is thus kept constant. The process is continuous, and only ceases when the oil of vitriol becomes too much diluted to remove more water. Formerly it was believed that in this process the sulphuric acid simply acted as a dehydrating agent, removing one molecule of water from two of alcohol to give E., thus—



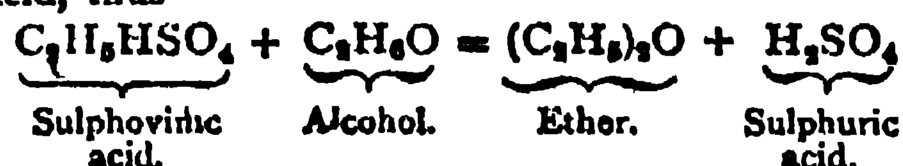
$$\underbrace{2(C_2H_6O)}_{\text{Alcohol.}} - \underbrace{H_2O}_{\text{Water.}} = \underbrace{(C_2H_5)_2O}_{\text{Ether.}}$$

The experiments of Williamson have, however, shown that the dehydration is not effected directly, but in two stages. In the first of these, sulphuric acid acts upon alcohol, forming sulphovinic acid and water, thus—



$$\underbrace{C_2H_6O}_{\text{Alcohol.}} + \underbrace{H_2SO_4}_{\text{Sulphuric acid.}} = \underbrace{C_2H_5HSO_4}_{\text{Sulphovinic acid.}} + \underbrace{H_2O}_{\text{Water.}}$$

The sulphovinic acid then acts on alcohol to form E. and sulphuric acid, thus—



The crude E. which distils over is purified by washing with milk of lime and water, and subsequent rectification. E. is a colourless mobile liquid, having a pleasant odour and burning taste. It is very volatile, and boils at 34·5° C. It is much lighter than water (sp. gr. 0·723), and therefore when agitated with that liquid separates after a short time in a layer which swims on the surface. It is employed in medicine as a stimulant and antispasmodic, and is also largely used as an anæsthetic, being considered by many surgeons safer than chloroform. It is an excellent solvent of fats, resins, alkaloids, &c., and is used for that purpose in the arts. Owing to its volatility and the cold produced by its evaporation, it is employed in several freezing machines.

Ethers are compounds of hydrocarbons, or of hydrocarbon radicals with elements or acids. Compounds of hydrocarbons and their radicals with elements are called *simple* E., while their compounds with acids are called *compound* E. Many of the latter occur in nature, and of these the Fats (q. v.) and many fruit essences are important examples. Thus oil of pears is the acetate of amyl, $C_5H_{11}C_2H_3O_2$; oil of pine-apple, butyrate of amyl, $C_5H_{11}C_4H_7O_2$, &c.

Ether, Luminiferous, the medium which is supposed to fill all space, and in which the phenomena of light, radiant heat, and probably electricity and magnetism, take place. The necessity of such a medium for the transmission of light is admitted, but there is still an evident reluctance on the part of some to extend its properties so as to embrace electric and magnetic phenomena. The gradual diminution of about two hours per revolution in the periodic time of Encke's comet, and the direct experiments of Professors Stewart and Tait on the rotation of a disc *in vacuo* (*Proceedings of the Royal Society*, 1865–66), hint at the existence of a resisting medium; and if such exist, it is to it that we naturally look as the vehicle for the transmission of energy. This E., then, to satisfy all the necessary conditions, must act both as a mobile fluid to permit the easy motion of matter through it, and as an elastic solid to admit of the transmission of light vibrations. Sir W. Thomson has fixed a superior limit to the density of the medium from calculations founded upon the known velocity of light; and Professor Clerk Maxwell, by making further assumptions regarding its power of *resilience*, has shown that such a medium can account for the more hidden actions of magnetic and electric induction, as well as for the phenomena of light and heat.

Eth'erege, Sir George, one of the Restoration dramatists, was born about 1636 in Oxfordshire. He was educated at Cambridge, travelled on the Continent, and on his return became the associate of Sedley, Rochester, Villiers, and other courtiers of Charles II. He was knighted about 1683, and sent as English minister to Hamburg and Ratisbon, where he died about 1694, from falling downstairs after a carouse. E. has left three comedies—*The Comical Revenge, or Love in a Tub* (1664); *She would if she could* (1668); *The Man of Mode, or Sir Fopling Flutter* (1676). Dryden (*Epistle to E.*) speaks of his terse comic wit, but his characters are flimsy, his dialogue generally trifling, and his plays only interesting from the swift succession of incidents. E. was imitated by Cibber. See Ward's *English Dramatic Literature*, vol. ii.

Eth'ics, or the science of morals, as generally taught, deals with several distinct matters. *First*, the question arises, which has perhaps excited as much metaphysical discussion as any, What is the ultimate standard of right and wrong? The replies are as numerous as the systems of E.: (*a*) The arbitrary will of God, expressed in the Bible as interpreted by the ruler or teacher who desires a sanction for any particular command; (*b*) the arbitrary will of human government regarded as absolutely irresponsible, a conception of Hobbes plausible enough in certain early stages of civilisation—*e.g.*, caste, but not applicable to states having representative institutions, or a diffused political intelligence; (*c*) a certain harmony of fitness, or intellectually perceived rightness of actions, which, as Cudworth says, is eternal and immutable, and which Price apparently classifies with mathematical intuitions, and deliverances of the intellect upon questions of beauty in colour or form; (*d*) the moral sense, which, as explained by Hutcheson, its author, means a susceptibility to certain specific and unique sensations or emotions, the causes of which being actions done or contemplated, we classify as virtuous and vicious, good or bad. (*e*) Self-interest, which was humorously but coarsely expounded by Mandeville in his *Fable of the Bees* as including and explaining all the sublimest virtues—a psychological blunder which has often unjustly been attributed to the Utilitarians. (*f*) The utility or probable consequences of conduct upon the human race directly, and also indirectly through the subsequent conduct of all. It will be seen that fundamentally there are here two views—1st, that the judgment arrived at by any particular mind on any particular question involving moral relations, shall be held to be sacred and final, whether intellect or emotion predominate in the judgment, and whether the judgment be a simple or a complex operation; (2d), that, admitting the existence of a faculty of conscience, whether original or derived, its judgments are liable to error, and may be corrected by reference to the true standard, which is an intelligible objective one, deduced from family, social, and political relations. E. is concerned, *second*, with the psychological questions of the Freedom of the Will (q. v.), whether there are, strictly speaking, any benevolent or purely disinterested emotions in the human mind; and lastly, what is a conscience, a primitive faculty of feeling or knowing, or a derivative growth and combination of the mind, the product, therefore, in part, at least, of the external circumstances under which the human race have lived. The question of primitive benevolence is very interesting and largely misunderstood. It may be said, as by Paley, that virtuous people obey God 'for the sake of everlasting happiness,' for a definite consideration or reward, or to escape some obvious inconvenience or threatened punishment. The reward, for instance, might be the calculated gratitude of the person benefited, or simply a love of admiration, as frequently in the case of pious and charitable bequests. Then if we are painfully affected by compassion, it is said we 'do good,' in the ecclesiastical sense of giving to the poor, in order to get rid of the pain. Again, if benevolence be pleasant to a benevolent person, that may be an ultimate fact of the mental constitution, but it would still only be a mode of self-regarding action to extend our own pleasure, others' pleasure being incidental. Lastly, the ordinary laws of association must, it is said, make many of our habits disinterested, even if they originally sprang from selfish motives. A large and powerful school of ethical writers, including Butler, Bain, Hume, and Adam Smith, maintain, though in very different senses, that, allowing for the influences above mentioned, there is a residual fact of primitive sympathy which urges men to relieve distress and to confer benefits. Perhaps the controversy has to some extent lost sight of the enormous differences which exist between classes and individuals even of the same nation. In some cases no sympathy is discoverable; in other cases, it is the principle of life. *Third*, an important ethical question, wholly insoluble, is what is the *summum bonum*. *Summa bona* are as numerous as individual characters; in each case it is to be found in the direction which promises the greatest amount of healthy and vigorous life. The ascetic and the epicurean schools represent duty and happiness as *summa bona*; the first is certainly too contracted, the second is misleading, unless happiness be defined so as to include all the activities of the organism. Modern E. does not deal much with the formal classification of duties. It is a science, not an art. It is the business of moralists and preachers, and especially of private individuals, to elaborate a code of duty. The relations of E. to law, politics, and religion, have of course varied much from time. Many ethical duties are recognised and enforced by law, and the opposite failures in duty, crimes, delicts, and quasi-delicts are prohibited. Other 'natural obligations,' as they are called in the language of the Roman law, are recognised, not as separately enforceable, but as pleadable in equity by the creditor in them against the performance of counter-duties towards the debtor. Of course, the morality of this partial recognition may itself be questioned, and is indeed emphatically condemned by the Christian Scriptures. The political question, how far the state should instruct the intelligence and control the will of the subject, is a fundamental one, and cannot

be intelligibly stated, much less thoroughly discussed, except by men familiar with the ascertained laws of psychology.

Ethio'pia. *Name and Geography.*—The Greek *aithiops*, from which the name is derived, is probably a corruption of the native Egyptian name, *Ethaush*, although the Greeks regarded it as meaning sunburnt, from *aithō*, 'I burn,' and *ōps*, 'face.' They applied the term—(1) To all dark races of men; (2) to the inhabitants of all southern regions with which they were not acquainted; (3) to all the inhabitants of Africa S. of Mauritania, the Great Desert, and Egypt; and (4) more specifically to the inhabitants of E. That country lies immediately to the S. of Egypt in the Nile valley, extending from Syene (Assouan), or the First Cataract, to the confluence of the Blue Nile and the White Nile. This territory, which nearly corresponds to Nubia, was E. proper, or the kingdom of Meroë; and it is to this that the references in the Bible are generally, if not always, made. But, in truth, the northern was the only boundary that was definitely fixed; and in a more extended sense E. included Nubia, Sennaar, Kordofan, and Abyssinia, while the part with which it is identified in modern times is Abyssinia. The principal feature in the physical geography of the country, as in that of Egypt, is the river Nile. The White or true Nile, from the Nyanza lakes in tropical Africa, and flowing through great marshes, is joined at Khartoum by the Blue Nile from the highlands of Abyssinia, and farther down, at Berber, by the Tacazze (formerly Atbara, and anciently Astaboras). Between Khartoum and Berber was the so-called island of Meroë, which was the favourite capital of the kings in the later period; although, like that of E., this was an ill-defined name, for, belonging first to Upper Egypt, it was gradually shifted southward. The other capital, Napata, was situated on the southern reach of the great bend to the W. made by the Nile. Near it is the sacred rock of Barkal. Just beyond the S.W. angle of this bend is the island of Argo, which was the limit of the ancient Egyptian conquests of the country.

Race and Language.—At the present day E. is inhabited by a great variety of tribes of a race intermediate between the Negro and the Aryan and Semitic races. Nearest to Egypt is a very dark tribe, the Kunuz, said to be of Arab origin; next, the Nubeh, much fairer; next come tribes of Arab blood, but fair; the distinctly-marked Semitic Abyssinians; and, lastly, tribes as dark as negroes, though not of the pure negro type. When the race of Kish (Cush) is represented on the Egyptian monuments by a single individual, he is of the negro type; and in one passage at least of the Bible (Jer. xiii. 23) Ethiopian appears to be equivalent to negro. There are strong reasons for thinking that in primitive times there was a stream of migration from E. through Arabia, Babylonia, Persia, to Western India (*Genesis of the Earth and of Man*; Rawlinson's *Herodotus*). But, on the other hand, there must have been later a stream of Semitic migration in the opposite direction. The predominant races in Abyssinia at the present day are Semitic, and must have crossed the Red Sea from the W. of Arabia. The settlements of the descendants of Cush (Gen. x.) may be traced from Meroë to Babylonia; and by the E. 'compassed' by the river Gihon (Gen. ii. 10) is probably meant the S. of Arabia. The Ethiopic or Gîz, which is the ancient and only written language of Abyssinia, and in which there is a complete translation of the Bible and other religious and historical works, has a strong affinity both in the forms of the alphabet and the grammatical structure with the old Arabic. Gîz ceased, however, to be the vernacular of the country in the 14th c., and was superseded by the Tigrè and the Amharic, which are regarded by the best authorities as dialects of the former.

The ancient history of E. is part of the history of Egypt (q. v.). For the modern history of E. see ABYSSINIA. See Brugsch's *Geographische Inschriften*; Lepsius' *Denkmäler*; R. S. Poole, in Kitto's *Cyclopædia of Biblical Literature* (new ed. 1863); Birch's *Egypt from the Monuments* (S. P. C. K., 1875).

Eth'moid, one of the bones of the cranium, placed between the orbital plates of the frontal bone, immediately behind the root of the nose, and entering also into the formation of the orbits and of the nasal fossæ. It is so termed (from *ethmos*, 'a sieve,' and *eidos*, 'form'), as it is perforated by numerous minute openings for the passage of the olfactory nerves to the nose.

Ethnol'ogy Gr. *ethnos*, 'nation' or 'race,' and *logos*, 'a discourse') is the science of the fundamental resemblances and differences of human species or races. The procedure is to divide the human family into classes, sub-classes, varieties, sub-varieties, sections, and sub-sections, according to some well-marked types of physical organisation, and then to accumulate evidence on each of these divisions from languages, religions, folklore, laws, customs, institutions, works of art and industry, &c. This evidence, which is being always collected by able specialists, tends in the first place to test the accuracy of the original classification, and in the next place to suggest the permanent conditions under which the great modifications of both physical and spiritual organisation have taken place. It is hardly necessary to add that E. or anthropology accepts analogies from the comparative biology of the lower animals, and that the larger facts of written history are also made use of. The special name of Zoological Anthropology is given to that part of the science which deals with the relations of man and the brutes—relations which are seen in geographical distribution as well as in general biology. This conception has been extended by Agassiz to the vegetable kingdom. Let us take the most recent, and perhaps the most trustworthy, classification, that of Huxley:—(1) The Australioid type. The males are of fair stature, with well-developed torso and arms, but very slender legs. The colour of the skin is some shade of chocolate brown, and the eyes very dark brown or black. The hair is fine and silky, usually raven black, never woolly, but wavy and tolerably long. The Australians are dolichocephalic (long-skulled), the cranial index often not amounting to more than seventy-one or seventy-two; the nose is broad rather than flat, the jaws heavy, the lips very coarse and flexible, and the *Norma occipitalis* sharply pentagonal. The brow-ridges are strong and prominent, the teeth large, and the fangs strong. These marks are seen in the Dasyu hill tribes inhabiting the interior of the Dekhan. The ordinary Coolie is nearly Australian. The Egyptian, too, though changed by civilisation and probably admixture, has also the dark skin, black silky wavy hair, long skull, fleshy lips, and broad *alæ* of the nose. (2) The Negroid type is best represented by the negro of S. Africa (including Madagascar), between the Sahara and the region of the Cape. He is of fair stature; his body and limbs are well made; his skin is black, with shades of brown; his eyes, brown or black; his hair is black, short, and crisp; his beard and body-hair scanty. He is dolichocephalic, the cranial index being often only seventy-three. His forehead is childlike and feminine. The *norma occipitalis* is often pentagonal. Like the Australioid, there is generally prognathism (protruding jaws). The nasal bones are depressed, giving a characteristic flat nose. The lips are coarse and projecting. The Bushmen of the Cape area are a special type, marked by low stature, the males not much exceeding 4 feet in height; both sexes, however, are well made. The skin is yellowish brown, the eyes and hair black, the latter woolly. The antero-posterior diameter of female pelvis is of great relative length. The accumulation of fat on the buttocks, and the large nymphæ of females, are also characteristic. Hottentots are said to be a cross between Bushmen and Negroes. Another modification, the Negritos, occurs in the Andamans, Malacca, Philippines, Tasmania, and the islands parallel to the Australian coast, from Wallace's Line to New Caledonia. The Andamans have a cranial index of eighty; all the rest are dolichocephalic, though some in the S. and E. approach the Australioid in large brow-ridges and otherwise (*e.g.*, Tasmania, New Caledonia, New Guinea, and Torres Straits). There is perhaps a cross with Malays in New Guinea; more probably a cross with Polynesians in the Feejees. (3) Xanthochroic, or fair whites, found in the greater part of the population of Central Europe. They are of tall stature, have a colourless skin (through which the blood shows), blue eyes or grey, hair ranging from straw-colour to red or chestnut, and beard and body-hair abundant. They are both dolichocephalic and brachycephalic (short-skulled). On the S. and W. this type meets the Melanochroi, or dark whites; on the N. and E. it meets the Mongoloid. (4) The great area E. of a line drawn from Lapland to Siam is peopled chiefly by the Mongoloid, who are short, squat, with yellow-brown skin; eyes and hair black, the latter coarse, straight, long on the scalp, but scanty on the body and face. They are sometimes very brachycephalic, without prominent brow-ridges, nose flat and small, eyes oblique. The Malays proper and the indigenes of the Philippines, who are not Negritos, probably belong to this group. The Chinese and Japanese, on the other hand, are distinguished chiefly by

being dolichocephalic; this characteristic occurs also in the ancient Ainos (found, for example, in Yesso), who are further remarkable for the development of hair on face and body, and the dull-red earthy skin. The Dyaks of Borneo, the Battaks of Sumatra, the Alfures of Celebes, are all dolichocephalic, and seem to pass through the people of the Pelew Islands and of the Caroline and Ladrone Archipelagos into the Polynesians, in whom the straight hair and oblique eye have disappeared, the skull being long and coming back to the Australioid type. The Polynesian type is best seen in the Maoris of New Zealand; brachycephaly occurs in the Sandwich and Samoan Islands. Language shows that Polynesia was peopled from the west, and it is thought that the Polynesian type may be a cross between the Dyak-Malay and the Negrito elements in Indo-nesia. In N.E. Asia the Tchuktchi are said to be the same as the Eskimos and Greenlanders of N. America; with Mongoloid hair and skin they have very long skulls. Dolichocephaly also distinguishes the aborigines of both Americas from the Asiatic Mongoloid; only the Patagonians and the ancient mound-builders are brachycephalic. There is the same sort of contrast and resemblance between a Mongol proper and an Iroquois as between a Malay and a Maori. The Melanochroi, mixed occasionally with Xanthochroi and Mongoloids, are to be found in W. and S. Europe, cis-Saharal Africa, Asia Minor, Syria, Arabia, Persia, and Hindustan. The type is seen in Irishmen, Welshmen, Bretons, Spaniards, S. Italians, Greeks, Armenians, Arabs, and high-caste Brahmins. In physical beauty and intellectual development they often excel the Xanthochroi, but the skin, though transparent, is brown, deepening to olive; the eyes and hair are black, the latter fine and wavy. This type shades off into the Xanthochroic and the Dekhan variety of Australioid. The contrast between the uniformity of race through the various climatic zones of America and the variety of race in one zone of the Asiatic Archipelago indicates that modification by physical conditions can play only one part in the present distribution of races. It will be observed that this classification discards the old division into Aryan and Semitic—the Indo-Germanic and Syro-Arabian of Dr Prichard—which was suggested chiefly by language, but of which even the philological boundaries are becoming indistinct. In criticism of Huxley's grouping it has been suggested that the fundamental division of the white races is not according to colour, but by a general type of physical development, which, it is alleged, would put the tall, handsome, hook-nosed Persians, the Afghans and other N.W. tribes of India, the Jews, Syrians, and N. Arabians together as the primitive and perfect white stock, degenerating by crossing into the Hindus, the short, swarthy, small-featured Arabs of Central and S. Arabia, and the mixed varieties of Europe. It has been pointed out in support of the radical difference of Mongoloid and Negroid that the former is distinguished by grave demeanour and concealment of the feelings, deliberate speech without violent gesticulation, rarity of laughter, and plaintive and melancholy songs. This is specially true of American Indians and Malays. The Negroid, on the other hand, is strongly marked by vivacity and excitability, strong exhibitions of feelings, loud and rapid speech, boisterous laughter, violent gesticulation, rude noisy music. These are certainly very fundamental mental differences, and they are seen in the Papuan of New Guinea as well as the African negro. With regard to the brown Polynesians (*e.g.*, in Tahiti), Mr Wallace thinks that, putting mental characteristics and general physical features (except colour) together, they must be held to be fundamentally Negroid, modified towards the Mongoloid type. (See map giving effect to this classification, *Journal Ethnological Society*, 1870, vol. ii. p. 368.) Since Linnæus divided the human race into *Europæus albescens, Americanus rubescens, Asiaticus fuscus, Africanus niger*, there have been various tests of scientific division proposed, such as Camper's *facial angle* (the angle formed by a line between the centre of the ear and the base of the nose, and a line from the most prominent part of the forehead to the most prominent part of the upper jaw-bone), which was said to increase with intellectual development; Blumenbach's *norma verticalis*, which expressed the result of several measurements of skull, frontal bones, cheekbones, jaws, and nose, and which gave the classification of Mongolian, Caucasian, Ethiopian, Malay, and American. Cuvier included Malay and American under Mongolian. Latham, the philologist, gives Mongolidæ, Atlantidæ, and Japetidæ, and maintains the European origin of the Aryan family. The *Mongolidæ* include several Indian nationalities, as the Cingalese, Kashmirian, Tamul, and their language is stated to be for the most part in the agglutinative stage. The *Atlantidæ* include—besides the African Negroids—Syrians, Arabs, Jews, and the ancient Assyrians and Babylonians. Their language is said to be agglutinative, and very rarely inflectional. The *Japetidæ* are subdivided into Celts and Indo-Germanic, the latter into European and Iranian and some unclassed varieties; the language is described as mainly with amalgamate inflections. The question whether there was a one primitive stock of mankind, of which all existing nations and tribes are the modifications, is one which will probably never be settled. Prichard and Latham support the unity of man, the latter arguing from an assumed universal identity of language. But language might be borrowed by a distinct stock, or identities of language might be produced by different stocks exposed to similar conditions. On the other hand, language may be lost or thrown aside, and differences apparently fundamental in language (and there seem to be such) would not conflict with the supposed unity of men, were it established on appropriate evidence. But such questions are premature when existing kinds have not been accurately classified. The American school, founded by the diligent craniologist Morton, and supported by the speculation of Agassiz (that men along with animals may be arranged in certain combinations or faunæ, eight in number, and defined by geographical limits), maintain the primitive diversity of types as a doctrine. When extended observation of both physical and mental features has disclosed the facts to be explained, it will then be time to apply to these facts the hypothesis of unity or diversity.

E'thyl, a hydrocarbon radical which cannot be isolated as such, but which occurs in many compounds, of which the most important are alcohol (hydrate of E.), $C_2H_5(OH)$; ether (oxide of E.), $(C_2H_5)_2O$; nitric ether (nitrate of E.), $C_2H_5(NO_3)$; acetic ether (acetate of E.), $C_2H(C_2H_3O_2)$. When attempts are made to isolate E. (C_2H_5), it becomes doubled, forming diethyl or butane, C_4H_{10}.

Eth'ylene. See OLEFIANT OIL.

Étienne, St, the capital of the department of Loire, France, on both banks of the Furens, a branch of the Loire, 35 miles S.S.W. of Lyons by railway. It has a Gothic church of St Étienne of the 12th c., and an Hôtel de Ville, with a museum of the industrial products of the town. E. is one of the most important manufacturing places in France. The production of ribbons alone employs 40,000 workmen, and the annual value of the industry amounts to about £3,000,000. Among the other large manufactures are iron-wares (to the annual value of 4,000,000 francs), arms, steel, machinery, edge-tools, hats, and pottery. There are also fifteen large coal-pits in the vicinity, employing 5000 miners, and yielding 1,575,000 tons yearly. Pop. (1872) 80,526. St E., the *Furanum* of the Romans, was the residence of the Counts of Forez in the 10th c. As early as the 11th c. it became a centre for ironwork and ribbon-making.

Etiol'ogy (Gr. *aitia*, 'a cause,' and *logos*, 'a discourse'), a term used to indicate that branch of medical science which has for its object the discovery of the causes of disease.

Etiquette' (Fr. 'a ticket;' origin uncertain), the unwritten laws of polite society in reference to social intercourse and matters of precedency and ceremony, so called from the circumstance that formerly tickets were distributed among persons invited to processions, &c., with instructions as to the place they were to take, &c. The fallacy that E. becomes more rigorous in each ascending stratum of society is probably due to the E. of the courts of Europe having till recently choked all free and natural life. In the court of Louis XIV. of France E. drove out sense and virtue, and spread from Versailles to the courts of Germany, where its influence was tyrannical and exacting down to our own time.

Et'ive, Loch, an arm of the sea extending inland from the Firth of Lorn into the district of Lorn, Argyleshire, about 9 miles E., after which it stretches about 11 miles N.E., with a breadth varying from ¼ of a mile to 2 or 3 miles. It is navigable for vessels of 100 tons. The scenery, especially in its upper part, is wildly picturesque. The ruins of Dunstaffnage Castle, originally the capital of the Da'riad kings and afterwards

the stronghold of the Macdougals of Lorn, lie on the S. side, about 3 miles N. of Oban.

Et'na, or **Ætna** (Gr. *Aitnē*, Lat. *Ætna*, not from Gr. *aithō*, 'I burn,' but from the Phœnician *attuna*, 'a furnace,' now called in Sicily *Monte Gibello*, a term compounded of the Italian *Monte* and the Arabic *Jibel*, both signifying 'mountain'), a celebrated volcano in the E. of Sicily. It is an isolated cone, 10,840 feet above the sea-level, with a base of 90 miles in circumference, and cut off from the mountains to the N. by the valley of the Alcantara, and from the range to the S. and W. by the basin of the Semeto or Giarretta. Eastward its base reaches to the sea. Its eruptions are recorded from an early period. Thucydides mentions three which had happened since the establishment of the Greeks in the island; the second, which seems to have been of unusual violence, being referred to 475 B.C. Shortly before the Christian era successive eruptions had made the district on the E. side of E. uninhabitable and almost impassable from want of water. There were important outbursts in 1169, when lava destroyed Catania with 15,000 of its inhabitants, in 1329, 1408, 1444, 1447, 1536, and in 1669, when the lava again reached Catania. Among the last violent eruptions were those of 1852, 1865, and 1868. On the side facing the sea is a capacious amphitheatre, named the *Val del Bove*. It is 5 miles in diameter, and hemmed in by 'dikes,' of from 500 to 3000 or 4000 feet high, displaying several hundred regular strata of dark lava, alternating with beds of tufa of an average thickness of 6 feet. The surface of E. is divided into three regions—(1) The *Desert*, including the crater-bearing cone, the highest part of which is covered with snow during eight months of the year; (2) the *Woody*, richly clad with beech, pine, oak; and (3) the *Cultivated*, around the base, producing in abundance corn and wine, oil and fruits.

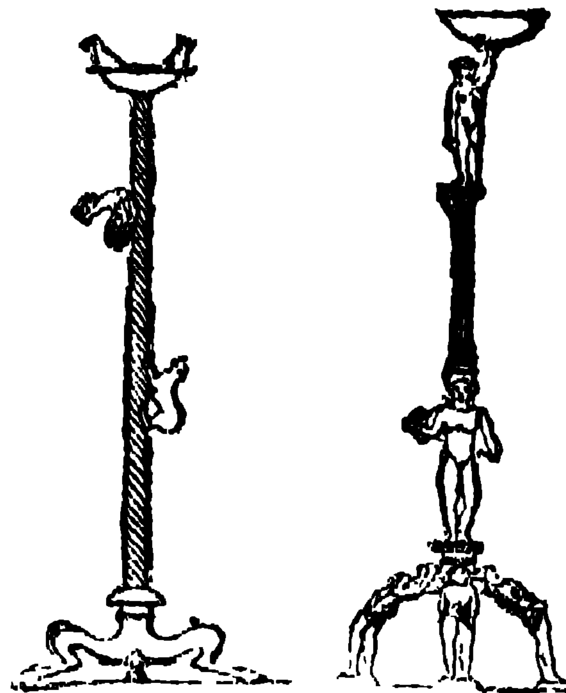
E'ton ('town on the water,' or 'meadow-land'), a town in Buckinghamshire, on the left bank of the Thames, opposite Windsor on the right bank, and connected with it by an iron bridge. It is 22 miles W.S.W. of London, and is near Slough Station on the Great Western Railway. Pop. of local board district (1871), 2806; of parish, 3261. The town owes its prosperity mainly to the College.

Eton College, one of the first public schools of England, was founded by Henry VI. in 1440, for a provost, 10 priests, 25 poor scholars, &c. The foundation (since 1868) consists of a provost, 10 fellows, 2 chaplains ('conducts'), and 70 scholars—the provost and fellows forming the 'governing body.' The buildings were commenced in 1441, and were, in part, finished and thrown open in 1443. The whole original structure was not completed till 1523. The chapel has been lately decorated, and the college hall was almost entirely rebuilt in 1858, the new features being chiefly the open timber roof with Louvre lantern, the Gothic windows filled with stained glass, and the floor of encaustic tiles. A large block of school buildings was erected (1862) at a cost of £10,000, and new mathematical schools (1876) at a cost of £15,000. The principal buildings are arranged in two quadrangles, on the N. side of which are the boys' library and apartments, called the New Buildings. The pupils (907 in Oct. 1878), consist of the 'collegers,' or scholars on the foundation, and the 'oppidans,' or students, who lodge outside the college or with the masters and fellows. There are two schools—an upper and a lower. Connected with the college are several valuable scholarships at King's College, Cambridge, obtainable by competitive examination. There are also the Newcastle and Tomline scholarships, besides prizes for modern languages, &c. For the history of this ancient and renowned institution, which is not without interest to all Englishmen, see H. C. M. Lyte, *History of E. C.*, 1440-1875 (Lond. Macmillan, 1875); *Memoirs of Celebrated Etonians*, by J. Heneage Jesse (Lond. 1875); and *The Eton Portrait Gallery, consisting of Short Memoirs of the more Eminent Eton Men*, by a Barrister of the Inner Temple (Lond. 1875).

Etru'ria. The Etruscans, Ras, or Rasenas, were among the primitive inhabitants of Italy distinguished from the Iapygians in the S. of the Peninsula, and the Italians—Latins and Sabellians—who occupied the middle. It is conjectured that they originally inhabited a large district N. of the Po, between the Ligurians and the Veneti. Niebuhr supposes, from an examination of the Groeden dialect in the Tyrol, that they came from beyond the Rhætian Alps. Mantua was an Etruscan town; so were Felsina (Bologna) and Ravenna. On this side they met the Umbrians, who built Hatria and Spina ('black town' and 'thorn-town'). Their chief settlement was, however, in the district now called Tuscany. The names Umbro, Camars (Clusium), the language and religion of Falerii in Southern E., suggest that the Etruscans pushed the Umbrians from the N., and perhaps the district of Falerii, Veli and Cære, Sutrium and Nepete, between the Ciminian forest and the Tiber, was not entered till the 2d c. after the foundation of Rome. The boundaries of E. proper were from the Arnus on the N., by Tarquinii and Pisæ, to the Tiber; the Apennines and the sea forming the other boundaries. To the N. was a debateable land called *E. Circumpadana*, sometimes held by the Ligurians. The northern origin of the Etruscans is favoured by the fact that only one town (Populonia, not among the oldest) is on the coast. The Lydian origin suggested by Herodotus arose from the accidental resemblance of the Lydian name *Torrheboi* to the native *Tursennæ* (Gr. *Tursenoi*, Umb. *Tursci*, Roman *Tusci* or *Etrusci*). The maritime fame of E. was confused with the piratical habits of Lydia. Besides, the short sturdy figures, large heads, and thick arms on the vases and bas-reliefs of Volterra and Clusium exclude the Greek origin. Egyptian inscriptions of Menephtah and Rameses III. introduce the Turska, distinguished by their pointed helmets, along with another race, who are said to be the Pelasgi. This, however, is too vague a ground even for conjecture. The Etruscans called themselves *autochthones*, and, as Dionysius reports, 'claimed alliance with no people in the world.' As is always the case, the bas-reliefs, &c., disclose many symbolical ideas suggestive of other nations. The Persian eagle-horse, the Egyptian man-wolf, the grotesque and horrible figures resembling the Egyptian and Phœnician Kabiri, or gods of punishment, the senator's *laticlavium*, the *prætexta* and sacerdotal *apex*, the curule chairs and lictors of Rome, are all found there. In the silence of recorded history, reference (often mistaken) is made to language. But the Etruscan language, while deciphered, is not translated. By the help of a bilingual inscription at Chiusi, however, the meaning of the terminations *al* (descent from the mother) and *sa* (referring to marriage into a clan) has been reached. In the earliest inscriptions (those on clay at Cære) the collision of two consonants is avoided; later (as at Perusia) vowels were rejected, terminals were thrown off, and the language became harsh. Tarquinius becomes Tarchnaf, Minerva Menrva, Hermes Thurms, and Bakchos Fufluns. The accent was thrown on the first syllable, and the distinctions *b p*, *c g*, *d t* were lost sight of. Except *φ*, which was too soft, all the aspirate consonants were used—Thethis for Tethis. Some of the names of divinities resemble the Italian; *e.g.*, Usil (Sol) is the Sun. The gentile terminations *enas* and *ena* resemble the Sabellian clan-names. Müller thought the language was Lydian, Humboldt suggested a connection with the Basque population. No trace of it has been found in the architecture of the sepulchre-builders (*Nuraghe*) of the Tuscan Islands. Mommsen goes no further than to say that there are Aryan elements in the language. As regards the Etruscan religion, it was pervaded by a gloomy mysticism, in which soothsaying and the manipulation of numbers played a prominent part. The worship was cruel, and included the slaughter of prisoners or slaves. The interpretation of entrails, of the flight of birds, of *lightning*, and other prodigies was learned from the dwarf Tages. According to Müller, the eagle was of good omen, the owl evil; though at Athens the owl was of good omen. The system was subtle and complex. The *fulmina* were divided into *publica*, *privata*, and *familiaria*, which varied in the extent and period of their application. According to Creuzer the *fulmina* were classified as *sicca*, *fumida*, *clara*, *peremptalia*, *affectata*, &c. A spot struck by a flash (*fulgurita* or *obstita*) was sacred, and enclosed by *bidentalia* or *putealia*. The birds which lacerated themselves were called *volsgua*; the favourable birds *remores*, *inhibæ*, and *arculæ*, the others *oscines* and *præpetes*. It is probable that the art of the Roman aruspex (which with the *lituus* divided the *templum* of the heavens by the *cardo* and the *decumanus* lines, and fixed the boundaries of fields by the *limites intersecivi*) was derived from E. The sacred square or oblong was imitated in the shape of towns, with temples, the *vorsus* of agrarian measure, and tombs. The world was finite, its 'great

year' being 6000 years; and the gods were subject to the *Dii Involuti*, the veiled deities. Among the former are Voltumna, goddess of change or fortune, and the double Janus, opening the gates of heaven and the year, turning with the sun, passing with time, flowing with rivers. His wife is sometimes Camasene, a fish; sometimes Venilia, the wave touching the shore; or Suturna, the daughter of winds and waters. An old man with wings and a hammer conducted the souls of the dead to hell to be tortured by mallets and serpents. There was a mode of redemption by sacrifice to the gods. The position of the *Dii Consentes* or *Complices* (Tina, Thurms, Sethlans or Vulcan) is not clearly defined. Nor do we know much of the patrician Lucumones, the Larths and Aruns, the eldest and second sons of the Cilnii, the Cæcinas, the Musonii, &c. As regards the early relations of E. and Rome, there is a tradition that Mezentius of Cære imposed a wine-tax on Latium, and two bands of Tuscans led by Cælius Vivenna and Mastarne are said to have settled on the Cælian Hill. There was a Tuscan quarter at the foot of the Palatine. The Veientes seem often to have disputed the possession of Fidenæ. The name of the last regal family in Rome, Tarquin, is Tuscan, and so is the woman's name Tanaquil or Tancluil.' But this does not imply any blending of the two races, or even a subjection of the one to the other. It was on the sea that the real power of the Tuscans lay. They were pirates, and traded as far as Miletus and Sybaris, where it is said that silver formed the medium of exchange between the *æs rude* (copper) of E. and the gold of Miletus and Carthage. Through this trade, no doubt, came many ideas which have been used to prove an Ionian origin. While the 'wild Tyrrhenian' was a pirate, peaceful trade relations seem to have existed between Southern E., or at least the town of Cære, and both Greeks and Phœnicians. The Tuscan king Arimnus presented gifts to the Olympian Zeus, and Cære had a special treasury in the temple of the Delphic Apollo. But the Etruscans dislodged the Greeks from Æthalia and Populonia, and held sway in Antium and Sunactum, making the cliff of Capri a centre for their freebooting expeditions. It is even said they founded a league of twelve towns in Campania. In 550 B.C. we find gold and silver coins struck by the Etruscans after a model and standard distinctly Attic or Ionian. They had great commercial advantages; the free ports on the Adriatic, the land route from Pisæ to Spina, and the productive fields of Capua and Nola. They had the iron of Æthalia, the copper of Volaterræ and Campania, the silver of Populonia, and the amber trade from the Baltic, which came overland to the mouth of the Po. There are many Attic earthenware vases in the Etruscan tombs, and many Etruscan gold cups and bronze candlesticks at Athens. They also excelled in *terra-cotta* work, which was generally spoken of at Rome as 'Tuscanic.' Their lapidaries adhered to the form of the *scarabæus* or beetle. Tomb-painting, mirror-designing, and graving on stone were their chief forms of art. Contour-drawing in metal and monochromatic fresco-painting are both excellent. But the taste is bad: 'the severe becomes harsh, the graceful effeminate, the awful horrible, and the voluptuous obscene.' The Tuscan temple differs from the Greek types in the course of columns carried round the *cella*, or enclosed quadrangular space, and in placing a separate pedestal under each column; the outline is nearer a square; the gable is higher; the intervals between the columns, the inclination of roof, and projection of corbels are all greater. It is, in fact, more like the modern private house. About the time of the expulsion of the Tarquins, the power of the Etruscans (then in alliance with Carthage) was at its height. They had already got Corsica, and Larth Porsena, King of Clusium, by a successful war (B.C. 507) would have obtained Latium but for the intervention of the Cumæans. Rome undoubtedly fell for some time under Etrurian authority, and was forced 'to cede all her possessions on the right bank of the Tiber to the adjacent Tuscan communities, thus abandoning her exclusive command of the river; and she also delivered to the conqueror all her weapons of war, promising to make use of iron thenceforth only for the ploughshare. It seemed as if a union of Italy under Tuscan supremacy was not far distant' (Mommsen's *Römische Geschichte*, book ii. chap. iv.). The fall of Xerxes and Hamilcar was followed (B.C. 474) by Hiero's victory over the Etruscans, which is the subject of the first Pythian Ode of Pindar. The Massiliots and Syracusans then became powerful competitors in the Mediterranean. Dionysius attacked both Hatria and Pyrgi, and at last the Etruscans, abandoning Carthage, sent eighteen war-ships to the help of Agathocles. While the Romans took Fidenæ, the Samnites took Capua, thus destroying Etruscan influence in Campania. Then came the war against Veii (B.C. 396), in which Camillus inaugurated the splendid career of victory which awaited his nation. The ravages of the Celts from Gaul still further weakened the Tuscans, disconnecting their settlements on the Adriatic, and Southern E. began to enter into *civitas sine suffragio* with Rome. The reign of the Lucumones had now passed into a form of patrician government supported by priestly monopoly. The hegemony of Volsinii was merely nominal, and indeed in B.C. 301 and 260 Roman help was got to suppress popular risings. The reign of luxury and sensuality had begun. 'The Greek authors of this age are full of descriptions of the unbounded luxury of Etruscan life; poets of Lower Italy in the 5th c. of the city celebrate the Tyrrhenian wine; Timæus and Theopompus delineate pictures of Etruscan unchastity and of Etruscan banquets, such as fall nothing short of the worst Byzantine or French demoralisation. Unattested as may be the details in these accounts, the statement at least appears to be well founded that the detestable amusement of gladiatorial combats—the gangrene of the later Rome and of the last epoch of antiquity generally—first came into vogue among the Etruscans. At any rate there is no room on the whole to doubt the deep degeneracy of the nation. It pervaded even its political condition' (Mommsen's *Römische Geschichte*, book ii.). Yet in spite of their moral decline, and in spite of the disaster at the Vadimonian Lake (B.C. 310), they were able to give succour to the Samnites in their long struggle against Rome, and they joined the Lucanians in their combination with Pyrrhus, fighting however, by Senonian Celtic mercenaries, and not by native soldiery, for the energies of the nation had been virtually broken; and one may safely say that they had lost the possibility of becoming a great nation from the day of Veii and Melpum. During the revolt of the Italian subjects the Etruscans supported Rome, as they had before supported the equites against Drusus, whose plans of reform threatened the domains of the large proprietors. They also made a struggle against Sulla. He gave much of the district to his successful legions, and this example was followed by Julius Cæsar and Augustus. E. is then lost in the Roman Empire. The question how far there was continuity of life in the Italian towns until the *Motta* was formed and the struggle against imperial power began is one of the most difficult in history. Besides Müller's work *Die Etrusker*, published in 1828, the great storehouse of learning on the origins of E. and of the Italian language is Corssen, *Ueber Aussprache, Vocalismus, und Betonung der Lateinischen Sprache* (Leips. 1868, 2 vols.). A text of the Eugubian Brasses (found A.D. 1444) and of the Perugian Inscription will be found in Sir William Betham's *Etruria Celtica* (2 vols. 1842).


Vase.


Candlestick.

Etschmiad'sin, a fortified monastery in the Russian government of Erivan, on a tableland 20 miles N. of the town of E., ceded to Russia by Persia in 1828. Famous as the seat of the Armenian Katholikos or patriarch since 1441, and the meeting-place of the synod of the Armenian Church, it has been called the 'Rome of Armenia.' It has splendid buildings and gardens, several churches, a library (once much richer in Armenian literature than it is now), and some notable relics; among

others, a bit of Noah's ark, the point of the spear which pierced the Saviour on the cross, the hand of Jacobus of Nisibis, and of St Gregory himself.

Ett'müller, Ernst Moritz Ludwig, a German scholar, born at Gersdorf, Saxony, October 5, 1802, studied at Leipzig, and devoted himself to linguistic research. He edited many old German works, such as *Sant Oswaldes Leben* (1835), *Frawen Helchen Süne* (1846), produced a valuable *Lexicon Anglo-Saxonicum* (1851), translated the poetic Edda and *Beowulf* (q. v.), and wrote a number of original poems, the *Deutsche Stamm-Könige* (1844), *Kaiser Karl* (1847), &c. He died at Zürich, April 1877.

Ett'rick, a district and river in the S. of Scotland famous in Border song and story. The river, which rises in the extreme S. of Selkirkshire and flows N.E. to its junction with the Tweed, is, like its affluent the Yarrow, a 'river bare, that glides the dark hills under;' yet the pastoral solitudes through which it runs are inexpressibly beautiful. E. Forest formerly embraced the whole of Selkirkshire, and was a famous hunting-ground in the days of the Stuarts. At Tushielaw, midway up E. Vale, Adam Scot, the famous freebooter, was hanged by James V. Boston, of the *Fourfold State*, was minister of E. parish; and the poet Hogg is familiarly known as 'the E. Shepherd,' because he was born in the Forest, and spent his youth there as a shepherd.

Ett'y, William, R.A., a famous painter, was born at York, March 10, 1787, and after seven years' apprenticeship with a printer, became in 1805 a student at the Royal Academy, London, where he had as fellow-pupils Haydon, Wilkie, and Eastlake. The Academy, after repeatedly rejecting his pictures, in 1820 accepted his 'Coral Finders,' which received marked applause. In 1822 he set out for Italy, where he studied Titian, Veronese, and the other great Venetians. He was elected an Associate of the Academy in 1824, and an Academician in 1828, in which year the Royal Scottish Academy purchased his three large pictures on the history of Judith. His fame was now wide, and his works commanded high prices. Between 1811 and 1849 he produced above 200 pictures, of which the chief were 'Pandora Crowned by the Seasons,' 'The Combat,' held to be his masterpiece, 'Benaiah,' 'Ulysses and the Syrens,' 'Joan of Arc,' 'Cleopatra,' 'The Storm,' 'Lute-player,' 'Youth at the Prow and Pleasure at the Helm,' 'Amoret Chained.' He died at York, November 30, 1849. After being unduly ignored, E. has been grossly overrated. His works are often shallow and vulgar, and his glowing nudities the result of a false ideal. 'No one,' says Ruskin, 'told E. what to paint, and he studied antique, and painted dances of nymphs in yellow shawls to the end of his days. His is gone to the grave a lost mind.' See E.'s Autobiography, and Gilchrist's *Life of E.* (Lond. 1855).

Etymol'ogy (Gr. *etymon*, 'the true literal sense,' *i.e.*, of a word, and *logos*, 'a discourse') treats of the structure and history of words, and of the connections between various languages. In its widest sense it is usually termed Philology (q. v.). In a narrower but more familiar sense it denotes that branch of grammar which deals with the different parts of speech and the various modes of inflection.

Eu (Lat. *Auga* or *Aguim*), a town of France, department of Seine-Inférieure, on the Bresle, 2½ miles from its mouth and 20 E.N.E. of Dieppe. It has a fine Gothic church of the 12th c., an old church of the Jesuits containing the tombs of Catherine of Kleve and Henri of Guise, and a famous château which was begun by François of Guise in the 14th c., and which belonged to the Orleans family till 1852. The château is surrounded by a beautiful park, and contains perhaps the finest collection of historical portraits in France. Pop. (1872) 3673. E. was in the possession of the Comtes d'E., a branch of the Norman royal family, till the 12th c. The title Comte d'E. was conferred on the eldest son of the Duc de Nemours (born 1824) by his grandsire Louis Philippe. The town has some manufactures of lace, waxcloth, sailcloth, tow, hemp, linens, &c. See Vatout's *Le Château d'E., Notices Historiques* (5 vols. Paris 1836).

Eubœ'a (*Egripo, Negroponte*), by far the largest island of insular Greece, is situated in the Ægean Sea, and lies parallel to the mainland. The channel on the N. is called Trikeri, and on the W. Talanta and Egripo. It is only 40 yards wide at Chalcis, where it is bridged over. E. is about 90 miles long from N. to S., and its extreme breadth is 30 miles, though at one point it is not more than 4 miles across. Throughout the island runs a range of mountains, of which Mount Delphi on the eastern coast is 7266 feet high; and the south is particularly mountainous. The soil in the plains is fertile, and there are excellent pastures on the mountain slopes. Vines, corn, and olives are chiefly cultivated. Copper and iron are found in the mountains. The chief towns are Chalcis and Carystos. In ancient times E. was divided among six or seven independent cities, of which Chalcis and Eretria were the most important. They were mostly inhabited by Ionic Greeks. For a long period the island acknowledged the supremacy of Athens, though it frequently asserted its independence. It passed successively under the sway of the Macedonians, Romans, Venetians, and Turks. It is now part of the modern kingdom of Greece.

Eucalyp'tus, in botany, a genus of plants of the natural order *Myrtaceæ*, and indigenous to Australia, Tasmania, New Guinea, and some of the neighbouring islands. Of the 150 species known, most are trees, some of which attain an immense size. They are evergreen, and the leaves, which are thick and leathery, present their edges instead of their surfaces to the sun. A gum exudes from the bark after rain, whence they are known as gum-trees. They have been popularly divided into two classes, of which the one has a smooth bark, periodically shed in long strips; the other, a rough and fixed bark. The principal species are *E. globulus*, or blue gum; *E. gigantea*, or stringy bark; *E. rostrata*, or red gum; and *E. amydalina*, or peppermint. Specimens of the two first from 300 to 400 feet high are not uncommon, while a fallen peppermint has been measured which was 480 feet long, and of proportionate girth. Their timber is hard and very durable, but heavy. *E. globulus* yields products which are beginning to be esteemed for their medicinal properties. A preparation made from its leaves has been pronounced by French and Italian physicians, after experiment, to be an excellent substitute for quinine. Extensive plantations of this tree exist in Algeria, Southern France, the Roman Campagna, and India, and it is also being cultivated in Brazil and California, its great rapidity of growth and the beneficial influence it exerts upon malarious places being its chief passports to favour. The sap from the trunk of *E. Gunnii* is brewed into a kind of beer by the colonists. Many species of E. yield an essential oil which will doubtless become commercially important. That of *E. ericifolia* resembles Cajeput.

Eu'charist (Gr. from *eucharisteō*, 'I give thanks') is another name for the Lord's Supper (q. v.). The Jewish Passover, on which the E. is founded, was originally a feast of thanksgiving to the almighty creator for the fruits of the ground, but afterwards came to be specially associated with the deliverance from Egypt. Every master of a household who distributed bread and wine to his guests praised God who had given these fruits of the earth to man, and for the favour he had shown to his own people. For this reason the cup of wine over which he pronounced the thanksgiving was called the cup of blessing or thanksgiving. It was in allusion to this practice that St Paul (1 Cor. x. 16) called the sacramental cup 'the cup of blessing' (Gr. *to potērion tēs eulogias*). As the Greek words *eulogia* and *eucharistia* are synonymous, the latter came to be used by metonymy for the Lord's supper, in which 'the cup of blessing' plays such an important part.

Euc'lid of Alexandria, the world-famous geometer, lived, according to Proclus, in the time of the first Ptolemy (B.C. 323-283), and seems to have been the founder of the Alexandrian school of mathematics. His best known work is his *Elements*, a book which, in spite of its antiquity, and the rapid progress which mathematical science has undergone within the last few centuries, still retains its place, at least in Britain, as the standard authority from which the student first obtains the principles of geometry. The first Latin edition which could be called the *Elements of E.* was translated from the Arabic by Adelard of Bath about 1130. Since then there have been numerous editions, the best being those of Simpson and Playfair. E.'s other extant works are his *Data*, his *Appearances* (of the heavens), his *Optics* and *Catoptrics*. The treatises on *Music* and the *Division of the Scale* are not certainly by him. Pappus, Proclus, Eutocius, and others also ascribe to E. works on *Conic Sections*, *Porisms*, *Plane Loci*, and *Fallacies*, of which there is now no trace.

Euclid of Megara, a Greek philosopher, was one of the chief disciples of Socrates, on whose death (399 B.C.) he returned to his native city, where he became the founder of the Megaric or Dialectic school, which derived its doctrines from the Eleatics as well as from Socrates. The Megaric philosophers held that 'the good' is the leading universal in all things. Everything, they said, is good in so far as it *is*. Evil is only negation. The good is the element of agreement in all existing things. The Megaric school was also famous for its dialectical subtlety and logical puzzles.

Eudiom'eter (Gr. *eudios*, 'fine,' and *metron*, 'a measure') is an instrument employed in the analysis of gases. Many different forms of the E. are employed, but the simplest consists of a syphon tube closed at one end and graduated at the lower limb. Wires are sealed into the closed end in such a manner that they nearly touch, and an electric spark can be passed through the gases. The tube is partially filled with water to keep the gases enclosed, and the thumb is placed on the open limb to prevent their escaping when exploded.

Eudo'cia, or **Athenais**, born at Athens A.D. 394, was the daughter of Leontius, a sophist, who gave her a good education in Latin, Greek, rhetoric, astronomy, geometry, and arithmetic. She was very beautiful. Her father having left her only 100 pieces of gold, she went to Byzantium to see if the will could be reduced. Pulcheria, the sister of Theodosius II., struck by E.'s grace and culture, told the Emperor to marry the fair stranger, which he did, 7th June 421. On the retirement of Pulcheria from public affairs, E. from 443 to 450 practically governed the empire. Before this she had suffered from her husband's unfounded jealousy of Paulinus, the *magister officiorum*. She was further suspected of having plotted with the Grand Chamberlain, Chrysaphius, the deposition of the patriarch Flavian by the second Council of Ephesus ('Council of Thieves,' 449). Having become attached to the teaching of the heretic Eutyches, she quarrelled with Pulcheria, and the result was that she withdrew to Jerusalem, where she spent her life in restoring the sacred places, and where she was finally converted by Simeon Stylites to an orthodox view of the double nature in Christ. She died in 461. E. left several poems, but the only piece extant is a poem on St Cyprian, found in the Laurentian Library, Florence. See Gibbon's *Decl. and Fall of the Rom. Empire*.

Eudox'us of Cnidus, the astronomer, flourished in the first half of the 4th c. B.C. According to Laertius, he was for a time a pupil of Plato, but having suffered dismissal, he repaired to Egypt, where he remained thirteen years. On his return he is said to have introduced the sphere into Greece. Notices of him are numerous in the poem of Aratus and the works of Hipparchus, Strabo, Seneca, Aristotle, Archimedes, Vitruvius, Proclus, Cicero, Ptolemy, &c., but all his reputed writings are lost. He is said to have corrected the length of the year, to have introduced a theory of planetary motions, and to have determined the sun's diameter as nine times that of the moon's. Delambre considers him to have been ignorant of geometry.

Euganе'an Hills, also **Monti Isolo'te** or **Padua'ni**, a volcanic range in the province of Padua, N. Italy, which rises abruptly from the 'waveless plain of Lombardy' to a height in Monte-Venda of 1884 feet, and which extends from N. to S. for a distance of 19 miles. The E. give a title to one of the most musical of Shelley's poems.

Eugene', Prince François, de Savoie-Carignan, born at Paris 18th October 1663, entered the service of the Emperor Leopold I. in 1683. He fought with Victor Amadeus of Savoy in his campaigns in Dauphiné and elsewhere against the French. In 1697 we find him with the rank of a field-marshal inflicting the decisive defeat of Zentha (near the Theiss river in Hungary) on the Sultan Mustapha II. This was followed by the peace of Karlowitz (1699), by which Turkey ceded Transylvania to Austria, and Podolia and the Ukraine to Poland. E. was the hero of the opening scenes of the Spanish Succession War, driving back the French marshals Catinat and Villeroy in the N. of Italy. The brilliant assault on Cremona was, however, soon neutralised by Vendôme's victory of Luzzara (1702). E. now became president of the Aulic Council, and formed the league with Marlborough and Heinsius, the Grand Pensionary of Holland. The first fruit of this league was Blenheim (1704), where the army of Marsin and the Elector of Bavaria was destroyed. E. next measured strength with Vendôme at Cassano (Piedmont) without definite result. By the relief of Turin, however (where Marsin was again outgeneralled), he became master of N. Italy. After a fruitless invasion of Provence in 1707, he triumphed over Vendôme at Oudenarde (1708). Lille now fell. This victory, as well as that over Villars at Malplaquet (1709), was due to the perfect understanding between E. and Marlborough. When the latter was deprived of the command of the English army, and Anne made peace with France, E.'s glory seemed to leave him. The clever strategy of Villars disarmed Van Keppel (Lord Albemarle) and drove E. back on Brussels. Next year further reverses led to the peace of Rastadt. But fresh laurels were gained in 1716, when the Grand Vizier Ali with 150,000 Turks was routed at Petervaradein, and in 1717, when a second Turkish army was driven from the very walls of Belgrade. Only the peace of Passarowicz prevented E. from going to Constantinople. The Polish Succession War (1733) saw the veteran general once more on the Rhine, but he did not join battle with the unfortunate Berwick, whose rapid advance secured the peace of 1735. E. died at Vienna, 21st April 1736. He was an able diplomatist and administrator. Both Napoleon and Friedrich the Great placed him in the front rank of generals. 'The bright-eyed snuffy little man' had also gentler tastes: his palace became a museum of rare books, pictures, and specimens of natural history. His soldiers loved him, as the French guard did *Le Petit Caporal*; and his figure as the 'Saviour of Christendom at the Siege of Belgrade' has become classical in song. See Dumont's *Batailles gagnées par le Prince E.* (1723); Ferrari's *De Rebus Gestis Eug.* (Rome, 1747); and especially A. von Arneth's *Prinz E. von Savoyen* (3 vols. Vienna, 1858-59), a work based on the most comprehensive and original research.

Euge'nia, a genus of Exogenous plants belonging to the *Myrtaceæ* or myrtle order. Of this genus *E. pimenta* is the most familiar species. Its fruit is aromatic, and when dried is known as allspice, pimento, or Jamaica pepper. The flavour resembles that of cinnamon, cloves, and nutmeg. Other species are *E. acris* —which also yields pimento—*E. Malaccensis*, or Malay apple, and *E. Jambos*; the latter affords 'clove-apples.' *E. cauliflora*, the *E. inocarpa*, and the *E. dysenterica* of Brazil; the *E. cotonifolia*, or Cayenne cherry, and the *E. Michelii* of the W. Indies, have all edible fruit. The species of E. possess a calyx exhibiting a fourfold division, four petals, and a baccate or berry fruit consisting of one or two cells, with a seed in each cell. These plants grow in the Malay Archipelago, in the South Sea Islands, the W. Indies, Brazil, &c. A Chilian species, *E. Ugni*, has been acclimatised in the S. of Britain.

Eu'génie-Marie de Guzman, Condesa de Téba, ex-Empress of the French, born at Granada, in Spain, 5th May 1826, is the second daughter of the Count de Montijos and Donna Maria Manuela Kirkpatrick, whose father—connected with the old Scotch family of the Kirkpatricks of Closeburn—was for a time British consul at Malaga. She was married to the Emperor Napoleon III. 30th January 1853. While the Second Empire lasted, E. was distinguished as the dictatress of female fashions of dress, as the graceful head of the most brilliant court in Europe, and as the chief supporter of Ultramontanism in France. A son, born 16th March 1856, is the sole issue of this union. On the outbreak of the Franco-German war in 1870, she was, in the absence of Napoleon, made regent. After the revolution in Paris of the 4th September, consequent on the news of the surrender of Sedan, E. left France for England hurriedly, and has since resided at Camden House, Chislehurst, with her son, who is known as the Prince Imperial.

Euge'nius, the name of a Gallic teacher of rhetoric who in 392 conspired with Arbogastes to murder Valentinian and seize the imperial authority. He favoured the heathen element in the empire, and was destroyed in 394 by Theodosius.—**St E.**, Bishop of Carthage, in the latter part of the 5th c. bravely defended the orthodox Nicæan faith against Hunneric, Thrasimund, and other Arian Vandals. E. is also the name of four popes, of whom the last only, **E. IV.** (originally Gabriele Condolmieri), is of much importance. Born at Venice in the latter part of the 14th c., he rapidly rose to be Cardinal of Bologna, and on the

death of Martin V. in 1431 was chosen pope. With the help of Florence and Venice he compelled the Colonnas to restore the papal treasures they had abstracted, and then turned his attention to the refractory fathers of the council sitting at Basel (q. v.). Pressed by a democratic outbreak at Rome, E. yielded to the summons of the council to appear before it and to confirm its decrees, but in 1438 he dissolved it a second time and called a new council at Ferrara, chiefly for the Greek fathers, who proposed to unite with the Latin Church. After discussions on the simple and double procession of the Holy Ghost, purgatory, papal supremacy, the articles of union were agreed to. In the meantime the fathers at Basel had deposed him as guilty of simony, heresy, perjury, and schism. E. replied by excommunicating them all, and thus provoked the great schism, the council proceeding to elect Amadeus of Savoy as Pope Felix V. The project of Greek union was really a political measure of security against the Turks. With the same object, E. urged the Hungarians into the war which ended with the disaster of Varna (1444) and the death of the brave Hunyadi. E. himself after a troubled career died at Rome, 23d February 1447. He had distinguished men as secretaries—viz., the brothers Aretini, Poggio, and George of Trebizond. See Gibbon's *Decl. and Fall of the Rom. Emp.*, vol. xii., and authorities there cited.

Eugle'na, a microscopic organism occurring in infusions of decayed organic matter, and generally believed by naturalists to be an infusorian animalcule. Some authorities consider it to be a lower plant-form. The body is provided with a single lash-like filament or *flagellum* used for locomotion, and a pigment spot is also developed in the body. The E. may be coloured green with the same substance (*chlorophyll*) which imparts the green colour to plants. *E. viridis* is a familiar species.

Eu'gubine Tables (*Tabulæ Eugubinæ*), the name given to the famous bronze tablets found in 1444 in a subterranean vault near the site of the ancient Eugubium or Iguvium (*Gubbio*). They were originally nine in number, but in 1540 two were conveyed to Venice and never recovered. The remaining seven are preserved in Gubbio. On four the *characters* are Umbrian (which do not greatly differ from the Etruscan), on two Latin, on one partly Latin partly Umbrian. The *language*, however, which is undoubtedly the ancient Umbrian, is the same in all, and is quite distinct from both Etruscan and Latin, though exhibiting an affinity to the Latin in its older forms, and also to the Oscan. The four in Umbrian characters are earlier than the others, and are supposed to belong to the 4th c. B.C. All contain directions for sacrificial and other rites. See Lepsius, *De Tabulis Eugubinis* (1833), and *Inscriptiones Umbricæ et Oscæ* (Leips. 1841); Grotefend, *Rudimenta Linguæ Umbricæ* (Hanov. 1835–39); Aufrecht and Kirchhoff, *Die Umbrischen Sprach-Denkmäler* (Berl. 1849), and Bréal, *Les Tables Eugubines* (Par. 1875).

Eu'lenspiegel ('Owlglass') **Tyll**, the hero of a great number of German popular stories, who, as a wandering journeyman, travels over the country, indulging, under the guise of a simpleton, in knavish tricks and wild frolics. E. is most probably an imaginary character, but some assert that he was born at Kneittingen, Brunswick, that he roved through the N. of Germany, visited Rome and Poland, finally settled at Mölln, near Lübeck, and died there in 1350. A tombstone is shown at Mölln, with a looking-glass (*spiegel*) and an owl (*eule*) on it; but Damme, in Belgium, also claims to be the place where E. was buried. It is not known when or in what dialect the jocose tales in which E. figures were first written. Most probably they were composed in Low German, and from this were translated into High German by the Franciscan Thomas Murner, who collected and edited them in 1519. There is a new edition by Lappenberg in 1859. The stories are very indecent, but have been popular not only in Germany but in other parts of Europe, and have been translated into French, English, Latin, Dutch, Danish, and Polish. See Reichard's *Bibliothek der Romane*, Flogel's *Geschichte der Hofnarren*, and Gorre's *Ueber die Volksbücher*.

Eu'ler, Leonhard, one of the greatest mathematicians of last century, was born at Basel, April 15, 1707. In 1727 he accompanied the Bernoullis to St Petersburg, where on the retirement of Daniel Bernoulli he became professor of mathematics in the Academy of Sciences, then rapidly rising to a high position under the rule of Peter I. Here he published his *Mechanica Analytice Exposita* (1736), his *Tentamen Novæ Theoria Musicæ* (1739), besides numerous papers in the *Petersburg Memoirs*; among others those on isoperimetrical problems, which may be looked upon as anticipating the calculus of variations developed by Lagrange fifteen years later. In 1741 he went to Berlin, on the invitation of Friedrich the Great, to assist in forming an academy there. Here appeared his *Theoria Motuum Planetarum et Cometarum* (1744), his astronomical tables, and his *Institutiones Calculi Differentialis* (1755). In 1766 he returned to St Petersburg, where he published his *Institutiones Calculi Integralis* (1768–70), his celebrated *Lettres à une Princesse d'Allemagne* (1768–72), and his *Théorie Complète de la Construction et de la Manœuvre des Vaisseaux* (1773). Latterly he lost his eyesight, but his labours were still continued by the aid of an amanuensis. E. died September 7, 1783, while playing with his grandchild. Of his numerous works and memoirs many remain unpublished. See Fuss, *Notice sur les Travaux de L. Euler, tant Imprimés qu'Inédits* (St Petersb. 1843).

Eumen'ides (Gr. the 'well-disposed' or 'gracious' goddesses), a euphemism by which the Greeks designated certain dreadful powers whose real name they feared to utter. By a similar euphemism the Athenians called them *semnai theai*, the 'venerable goddesses.' They were called also by the Greeks *Erinnyes* (Gr. *erinō* or *ereunaō*, 'I persecute,' or *erinuō*, 'I am angry'), and by the Romans *Furiæ* or *Diræ*. They were more ancient than the Olympian gods, and dwelt in the thick darkness of the nether world. Homer, Hesiod, and the tragedians do not specify their number, but later writers restrict it to three. Their names are Alecto, Megæra, and Tisiphone. Their genealogy is variously given. Hesiod calls them the daughters of Ge by the blood of Uranus, Æschylus of Night, Sophocles of Darkness, others of Chaos and Terra. Stern and inexorable, they executed the vengeance of the gods, and punished the guilty here and hereafter. They are described by Æschylus as of grim and frightful aspect, with dark and gory garments, serpent-twined locks, and blood-dripping eyes. Later poets represent them with wings, holding in one hand a burning torch, in the other a whip of scorpions, and attended by Terror, Rage, Pallor, and Death. In works of art they appear as grave and serious maidens, richly attired, but still retaining the serpents and the torches. They were propitiated by offerings of black victims and libations composed of water, milk, and honey (*nēphalia meiligmata*). The white turtle dove and the narcissus were sacred to them. In their festival (*Eumenideia*) only freeborn citizens of virtuous life were allowed to take part.

Eumol'pus (Gr. 'sweetly singing'), a mythic bard and priest of Demeter, concerning whom there were numerous traditions. He is represented as the son of Poseidon and Chione. He was educated in Ethiopia, fled to Thracia, and subsequently aided the Eleusinians in a war with Athens, when he was slain by Erechtheus. E. introduced into Attica the Eleusinian mysteries and the cultivation of the vine. The Eumolpidæ, a sacerdotal family at Athens, derived their name from him.

Eu'nice, a large genus of Errantia (q. v.) or marine worms, the species of which live in the sand of our own and other coasts. One of the largest is *E. gigantea*, measuring 4 feet or more. These worms possess prominent side bristles or *setæ*, and the mouth is provided with a protrusible proboscis, armed with several pairs of horny jaws. The gills or branchiæ are large.

Euno'mius, the son of a peasant of Cappadocia, was ordained Bishop of Cyzicum in 360. On account of his intense zeal for Arianism he was soon after deposed and banished. After many vicissitudes he was allowed to return to his birthplace, where he died about 394. In the great doctrinal controversy in the 4th c. the orthodox Church party held the Son to be of the same substance with the Father (Gr. *homo-ousios*), in opposition to the Arians, who regarded him as only the highest of the *creatures*. The great majority of the heterodox, however, belonged to a middle or semi-Arian party, who adopted the phrase *homoi-ousios* ('of a similar substance') to express their idea of the relation of the Son to the Father. E. took up his position at the farthest extremity of the heterodox and became the leader of the ultra-Arians, so that these were known as the Eunomian party. The Son, according to him, was the first of created beings, and the Spirit the first among the created natures, formed according to the command of the Father by the agency of the Son. See Neander's *Geschichte der Christl. Rel. und Kirche* (4th ed. Gotha, 1866; Eng. trans. 1858).

Eu'nuch (Gr. *eunē*, 'a bed,' *echō*, 'I have') was the name applied to 'those unhappy men to whom are denied the pleasures of love and the hope of posterity,' and who have therefore been employed as the attendants of the female sex in polygamous countries. The practice of castration appears to have originated in Libya. In Asia and (though in a more limited degree) in Greece, besides taking charge of the women, the eunuchs acted generally as chamberlains, and in the Asiatic and Byzantine courts frequently enjoyed high official rank. The E. was found, with other tokens of Eastern luxury, at the courts of the Roman emperors. In the present day, the revolting practice of castration exists almost exclusively in Mohammedan countries.

Euom'phalos, a fossil genus of Gasteropodous mollusca, found in early Palæozoic strata, and dying out in the Trias. The shell is of discoidal form, the whorls being angular, the aperture five-sided, and the umbilicus or opening of the central spine or columella of large size. A large number of species are known.

Euon'ymus. See SPINDLE-TREE.

Eupato'ria (formerly *Koslov*), a town and port in the government of Taurida, Russia, on W. coast of the Crimea. It has a fine mosque, several manufactories, and important fisheries. It exports about £45,000 worth of hides, barley, wheat, &c., yearly. During the Crimean war the Allies selected E. as a landing-place for their troops. It was the headquarters of the Turks in 1854-55. Here, under Omar Pasha, they repulsed an attack of the Russians, 17th February 1855. Pop. 8294, mostly Tartars. About 12 miles distant is the large salt lake of Ssak.

Eupato'rium, a genus of Exogenous plants included in the order *Compositæ*. They have small flower-heads or *capitula* arranged in corymbs. The florets or separate flowers of the heads are tubular, each containing stamens and pistil. The receptacle is naked, and the stigmas or heads of the carpels (pistil) are club-shaped. These plants mostly inhabit the New World. The British species is *E. cannabinum*, or hemp agrimony, which is found in marshy districts. Its root used to be held in repute as a purgative, whilst the leaves were said to be diuretic. A common American species is *E. perfoliatum*, or thorough-wort, which is highly valued as an antiperiodic in intermittent fevers, such as ague, &c. It has a diaphoretic and purgative action. *E. purpureum* of N. America obtains its name of *gravel-root* from being used as a diuretic and preventive of 'gravel.' Another species, esteemed as a remedy for snake-bite, is *E. Ayapana* of N. Brazil and the E. Indies.

Eu'pen (called by the French *Neau*), a town of Rhenish Prussia, on the railway to Aachen, and 9 miles S. of that city. It has several churches, a Franciscan monastery, and an orphanage. E. is the seat of the most important cloth manufactures in Prussia. There are seventeen works, employing 3350 men. It has also manufactures of waxcloths, waxlights, and leather. There are, besides, machine and dye works. At the peace of 1814 E., with the other portions of the duchy of Limburg, was assigned to Prussia Pop. (1871) 14,670.

Eu'phemism (Gr. *eu*, 'well,' and *phēmi*, 'I speak') is the substitution of an indirect or delicate form of expression in order to avoid one that is unpleasant or offensive. Thus for 'he died,' we say 'he fell asleep,' 'he paid the debt of nature,' 'he was gathered to his fathers.' The ancients always had recourse to the E. to avoid expressions of evil omen—*e.g.*, they called the Furies *Eumenides*—a name of blessing for one of cursing.

Eu'phon, a musical instrument, similar in tone to a glass harmonicon, invented by Chladni.

Eupho'nium, a bass instrument of the Bugle (q. v.) class, used in brass bands.

Euphorbia'ceæ, a natural order of Exogenous plants, popularly named the 'spurge order,' from its including the *Euphorbiæ* or spurges and allied plants. It is a very large natural group, the species of which occur in both hemispheres. They are most numerous in tropical and sub-tropical regions. In Britain there are three genera (including fifteen species) of this order. The E. exist as trees, shrubs, and herbs, with opposite or alternate stipulate leaves. They have unisexual flowers, which occasionally possess one floral envelope only. The stamens are sometimes numerous, and united into one or more bundles. The ovary has one, two, three, or more cells, and the seeds are albuminous. The spurges yield a milky juice, used by African savages as a poison for arrows. The *latex* or juice of *Siphonia Brasiliensis* of Brazil affords a superior Caoutchouc (q. v.), which escapes from incisions made in the bark, and is allowed to dry on clay moulds. Over 145,000 cwt. were imported into Britain in 1868. Cassava is obtained from a species of the genus *Manihot*. In this order are also included the *Ricinus communis*, the castor-oil plant, and *Croton tiglium*, which furnishes croton oil. The boxwood of engravers is obtained from the *Buxus sempervirens*, another genus of E.; and *Oldfieldia Africana* yields African oak or teak.

Euphor'bium, the type-genus of the spurge order of plants, *Euphorbiaceæ* (q. v.). It has achlamydeous ('single-enveloped') monœcious flowers, and the various species yield a milky juice often of poisonous nature. *E. Lathyris*, or caper-spurge, affords an oil which has a powerfully purgative or cathartic action; *E. officinarum*, *E. antiquorum*, and *E. Canariensis*, a purgative resin named *E.*; and *E. ipecacuanha*, an emetic which is not to be confounded with the true Ipecacuanha (q. v.). Many of the euphorbias closely resemble the cactuses (see CACTACEÆ) in appearance. Some have scarlet and showy involucres surrounding their flowers, and some form spiny and dense hedges in Africa.

Euphra'sia. See EYE-BRIGHT.

Euphra'tes (Arab. *Frat*, 'the fruitful'), the largest river of Western Asia, rises in the Armenian highlands (*Anti-Taurus*) by two branches, the Murad and Kara Su, which unite 10 miles N. of Keban' Ma'den, about lat. 39° N. and long. 39° E. The stream thus formed flows W., dividing Armenia from Cappadocia, forces its way through the Taurus, and on reaching the plain country winds S. and S.E., passes the N. of Syria and N.E. of Arabia Deserta, and eventually, after many deviations, joins the Tigris, to terminate in the Persian Gulf. Its total length is 1750 miles, of which 1195 are navigable, while the area of its drainage is 255,000 sq. miles. The tributaries are few and of no great size, the largest being the Chabur. Among the towns washed by the E. are Bir, Deir, Anna, Hit, the ruined Babylon, Hillah, Lemlun, and Korna. The last of these is at the confluence of the E. and Tigris. Below this point the stream is called the Shat-el-Arab, and is 900 yards wide, from three to five fathoms deep, and 92 long. Bassora is on the Shat-el-Arab, which enters the sea by three channels, after receiving the Kerchu and Kuren from Persia. Above Hit the river is singularly picturesque; along the banks are many ancient aqueducts for irrigation. From Hit to Babylon the country is flat, and is partly cultivated by Arabs, whose villages, shaded by the date-tree, are dotted along the banks. Irrigating canals and cuts are frequent above the Lemlun marshes, which are flooded yearly, and which yield rich crops of grain and rice. Here the mud villages are annually swept away. The river is fringed with a continuous belt of fine date trees from Lemlun to the sea. The water of the E. is turbid, but when purified is sweet and wholesome. The river is at flood-tide in May, and at full ebb in November. In its latter state it is tranquil and sluggish, but when swollen it flows swiftly. It abounds in fish. From the earliest times it was used for navigation, and in the 15th c. it was the highway for European merchants to India.

Euphros'yne (Gr. 'mirth') was one of the three Graces, who presided at festive meetings.

Eu'phuism, the name of a literary style made fashionable in England by the *Euphues* (1580) of John Lyly. It was partly a growth of the Renaissance, being prevalent in France and Italy, and was marked by far-fetched illustrations, an abundance of classic allusions, flowery antithetic language, and extravagant hyperboles. It was ridiculed in Shakespeare's *Love's Labour's Lost*, and by Ben Jonson in *Asotus* in *Cynthia's Revels*. See articles LYLY and ENGLISH and FRENCH LITERATURE.

Euplectell'a, the name given to an elegant and beautiful genus of Siliceous or flinty sponges abundant at the Philippine Islands. The species of E. are known as 'Venus' flower-baskets,' the outward appearance of these organisms suggesting the form and shape of an elegant vase of from 8 to 10 inches in length, the sides of the vase being formed of a delicate network of siliceous or flinty fibres, whilst the lower part of the organism is provided with longer fibres serving to attach it to the sea-bed, and which resemble spun glass in appearance. *E. aspergillum* is the familiar species,

whilst a new species, *E. suberea*, was obtained in the dredge by the *Challenger* expedition. See also SPONGE.

Eu'poda, a family of *Coleoptera* (q. v.) or Beetles, belonging to the section *Tetramera*, including those with four joints in the tarsus. The segment of the limb named the 'thigh' by entomologists is usually very long in this group, which is represented by a few British and many exotic species.

Eure, a department of France, and part of the old province of Normandy, is bounded N. by Seine-Inférieure and the estuary of the Seine, E. by Oise and Seine-et-Oise, S. by Eure-et-Loir, and W. by Calvados and Orne. Area, 2301 sq. miles; pop. (1872) 377,874. It is very flat and woody, and is watered by the Seine, Eure, Iton, Risle, and Charentonne. The soil is a fertile alluvium, except along the Seine, where it is in part sterile and sandy. Besides grain, hemp, and flax, E. yields large quantities of apples and pears, of which are made excellent cider and perry. The breeding of horses, cattle, and sheep is largely carried on, and there are important manufactures of woollens, paper, glass, copper-ware, &c. E. is traversed by several lines of railway. Evreux is the capital, and among the other towns are Pont-Audemer, Louviers, Les Andelys, and Bernay.—The *river* E. rises in the W. of Orne, flows S.E. into the heart of Eure-et-Loir, winds abruptly N. through Eure, and enters the Seine near Pont-de-l'Arche after a course of 100 miles.

Eure-et-Loir, a department in the N.W. of France, bounded N. by Eure, E. by Seine-et-Oise and Loiret, S. by Loir-et-Cher, and W. by Sarthe and Orne. Area, 2268 sq. miles; pop. (1872) 282,622. It is traversed from E. to W. by the Plateau de la Beauce, separating the basins of the Seine and the Loire, and is watered by the Eure in the N., and the Loir and its affluent the Huisne in the S. The low country (La Beauce) is level, and produces excellent wheat, hops, &c., while the elevated region *du Perche* is intersected by rich valleys and covered with oak and birch forests. E.-et-L. produces good cavalry horses (*chevaux du Perche*). The value of the annual yield of grain, fruit, and vegetables amounts to 18,500,000 francs. The chief railway in E.-et-L. is the Paris à Brest. Capital, Chartres.

Eurip'ides, the latest in order and the least in fame of the three great tragic poets of Greece, was born at Salamis, B.C. 481. His parents were persons of rank and wealth. In early life he was a painter, and received a complete philosophical education, Prodicus having been his instructor in rhetoric, and Anaxagoras in physics; and he was the friend, if not the pupil, of Socrates. At an early age he devoted himself to tragic poetry, having exhibited the *Peliades* in his own name when twenty-five years old, but did not succeed in gaining a prize till B.C. 441. His attachment to the new philosophy and to the sophistical education of the time drew upon him the splendid slanders of Aristophanes, and the populace of Athens only granted him the prize five times out of seventy-five. In B.C. 408, E. sought refuge from the party violence of the Athenians at the court of Archelaus, king of Macedonia. It is said that he was there torn in pieces by hounds let loose upon him by two poets, Archidæus and Cratinus, whose enmity he had excited. He died at the age of seventy-five (406), and was buried at Pella. The dramas of E. are said by some to have been seventy-five, and by others ninety-two, in number. Of these, eighteen have come down to us, of which the following is a list, with the dates of their representations:—*Alcestis*, B.C. 438; *Medea*, 431; *Hippolytus*, 428; *Hecuba*, 424; *Heracleidæ*, 421; *Supplices*, *Ion*, *Hercules Furens*, *Andromache*, *Iphigeneia in Tauri* (dates uncertain); *Troades*, 415; *Electra* (about) 415; *Helena*, *Iphigeneia in Aulide*, *Bacchæ*, *Phœnissæ*, *Cyclops* (dates uncertain); *Orestes*, 408. In tragic power the *Medea* excels all the other dramas. The *Cyclops* is the only example of the ancient satiric drama now extant. In regard to the structure of his plays, E. has been severely criticised for his use of the prologue, so thoroughly undramatic in its character; and for the frequency with which the difficulties of his plots are solved by the intervention of a deity. Mrs Browning has applied to E. the epithet 'human,' in recognition of 'his touches of things common, till they rise to touch the spheres.' Sophocles, it was said, represented men as they ought to be, E. as they really are. From the supernatural in Æschylus and the heroic in Sophocles the Greek drama passes in E. to 'the romance of everyday life, the unexaggerated picture of manners in which the human heart, and the affections which influence it in its domestic relations, constitute the leading subject.' He delights in the 'nice distinctions of a sophistical philosophy, in brilliant antitheses, startling paradoxes, a dexterous use of language, and an affectation of pedantic ornament.' The ancient authorities regarding E. are the biographies in Suidas; in Musgrave's edition, by Thomas Magister; in Elmsley's edition of the *Bacchæ*, first published in 1821; and Aulus Gellius, xv. 20. The chief modern editions of the whole works are those of Barnes (1694), Musgrave (1778), Matthiæ (1813), Paley (1858), Kirchhoff (2 vols. Berl. 1855), and Nauck (3 vols. new ed. Leips. 1857–69). There is an English translation in verse by Potter (Oxford, 1814).

Euro'pa is the ancient name of the continent of Europe. It is commonly supposed to have been derived from E., the daughter of Agenor, king of Phœnicia, but Hermann has plausibly suggested its derivation from two Greek words, meaning the 'broad land.' The E. of the ancients at no time equalled in extent the modern continent. The primitive E. of Homer was comprised within very narrow dimensions, and at its greatest size the E. of the Greeks was bounded by the chain of mountains N. of Thrace, Italy, and Iberia, and did not comprehend more than a third of modern Europe. The geographical knowledge of Southern E. was obtained by the successive victories of the Roman arms, especially by the Gallic campaigns of Cæsar. The traders who followed the advancing legions of the Empire penetrated beyond the Elbe, the Weser, and the Vistula, but the conquerors possessed little, if any, knowledge of the races who roamed through the remoter regions of the N. Subsequent additions to the geography of E. are chiefly due to the Scandinavian pirates, to the Christian missionaries who explored Scythia and Sarmatia, and to Karl the Great, Ælfred the Great, and the Teutonic knights, by whom, in the annexation of Prussia, the long series of geographical discoveries was completed.

Eu'rope is the smallest of the three great divisions of the Old World, and is strictly a western prolongation of the continent of Asia. In proportion to its size it is by far the most populous of the great land divisions, while it is also the centre of culture, industry, and commerce. It is bounded N. by the Arctic Ocean, W. by the Atlantic, S. by the Mediterranean Sea, the Sea of Marmora, the Black Sea, and the Caucasus, and E. by the Caspian Sea, the river Ural, and the Ural Mountains. The extreme length, from Cape Roca (Portugal), in long. 9° 30′ W., to the Ural Mountains, 60° 20′ E., is 3400 miles; the breadth, from Cape Tarifa (Spain), in lat. 36° N., to Cape Nordkyn (Norway), 71° 5′ N., is 2760. But if we include insular E., the area is considerably wider. The chief projections of the coast are Scandinavia, Jutland, Brittany, the Iberian peninsula (Spain and Portugal), Italy, the Hellenic peninsula, and the Crimea in the Black Sea. Owing to the numerous indentations, of which the principal are the White Sea, the Baltic, the Bay of Biscay, and the Adriatic, the coast-line is comparatively longer than that of any other great division of the globe, having an estimated length of 19,500 miles, or 1 linear mile to every 175 sq. miles of surface. The political divisions, with areas and populations, are as follows, according to the *Almanach de Gotha* for 1876:—

States.	Area in sq. miles.	Population.
Russia in Europe,	2,059,226	71,207,786
The German Empire, 1871,	212,091	41,060,846
France, 1872,	201,900	36,102,921
Austro-Hungary, 1869,	240,955	35,904,435
Great Britain and Ireland (Malta, &c.), 1871,	121,723	31,977,377
Italy, 1871,	114,295	26,801,154
Spain, 1870,	195,774	16,835,506
Turkey (Rumania and Servia),	207,438	14,350,000
Sweden and Norway, 1874,	288,771	6,103,872
Belgium, 1873,	11,372	5,253,821
Portugal, 1872,	36,510	4,390,589
Netherlands, 1874,	20,529	3,767,263
Switzerland, 1870,	15,233	2,669,147
Denmark, 1874,	14,807	1,874,000
Greece, 1870,	19,941	1,457,894
Grand Duchy of Luxemburg, 1871,	1,592	197,528
Montenegro,	1,701	120,000
Andorra,	154	12,000
Principality of Lichtenstein,	62	8,060
San Marino, 1874,	22	7,816
Principality of Monaco, 1873,	4	5,741
	3,764,100	300,107,756

Belgium is by far the most densely-peopled country, having 462 inhabitants to the sq. mile; Russia is among the least populous, with an average of some 34. Great Britain, Germany, France, Austria, Russia, and Italy are known politically as 'the six great powers.' Nine of the European states have possessions in other divisions of the world, the aggregate area of which amounts to nearly five times as much as that of all E.

Physical Aspect.—The surface of E. consists of two large unequal portions of distinctly marked character. North-eastern E. is a plain 2,500,000 sq. miles in extent, and of great uniformity, while South-western E. is a tableland traversed by high mountains, and intersected by considerable plains and valleys. The great north-eastern plain extends from the Black Sea and the Caucasus N. to the Arctic Ocean, and from the Ural Mountains W. to the low shores of Holland and Hanover. Of plateaux the chief are those of Bavaria in Germany, Bohemia in Austria, Castile in Spain, and Auvergne in France. The *mountains* of Southern Europe, forming a great girdle, may be said to centre in the system of the Alps (q. v.), which reaches a height of 15,783 feet in Mont Blanc. Hence radiate the German Mittelgebirge, with their highest point of 5000 feet in the Riesengebirge; to the E. the Carpathians, enclosing in a vast crescent the entire W. plain of Hungary; to the S. and S.E. the ranges of Italy, Turkey, and Greece. The mountains of Spain, including the Pyrenees, are also linked to the Alpine system by the Cevennes and other chains of France. The Ural Mountains, the Caucasus, the table-topped mountains of Norway, and those of Britain, are isolated masses. Mount Elbruz, in the Caucasus (18,493 feet), is the loftiest peak in E. The higher European ranges are covered with perennial snow, and send down enormous glaciers. Volcanoes are comparatively numerous, the most notable being Vesuvius in Naples, Etna in Sicily, Hecla in Iceland, and those in the Lipari Isles. There are also many extinct volcanoes in Catalonia, the mountains of Auvergne, and in S. Germany. The *rivers* of E. are smaller than those of America and Asia, but are admirably distributed for purposes of fertilisation and commerce. They may be grouped into two systems, one flowing in a direction generally N. or W., the other S. or E. The latter includes the largest rivers, as the Volga (2400 miles), Danube, Dnieper, Dniester, Don, Po, Rhone, Ebro, &c.: the former has the Tagus, Garonne, Loire, Seine, Rhine, Weser, Elbe; the Oder, Vistula, Duna, Tornea, &c., entering the Baltic; the Onega, Dwina, Mezen, and Petchora flowing into the Arctic Sea. Most of these are navigable, and conduce greatly to the development of commerce in the inland countries. The *lakes* of E. are only inferior in extent and number to those of N. America. They are chiefly grouped round the E. coast of the Baltic and among the Alps. In Finnland are lakes Ladoga and Onega, by far the largest sheets of fresh water in E.; those of Switzerland and Italy are famous for their beauty.

Islands.—The aggregate area of the islands is about 191,000 sq. miles, or one-twentieth of all Europe. Proceeding from the N. the principal are Novaia Zemlia, Spitzbergen, the Lofodens, Iceland, the Faroe Isles, the British Isles; the Danish Isles, Bornholm Rügen, Gottland, and Aland Islands in the Baltic; the Balearic Islands, Sardinia, Corsica, Sicily, Malta, Crete, the Ionian Isles, and the Grecian Archipelago in the Mediterranean. E. is generally regarded as including the Azores and Madeira.

Climate.—E. is the only great division of the globe which nowhere touches the torrid zone, and is almost wholly within the temperate. The climate is partly continental and partly oceanic, and is throughout greatly more temperate than other countries of equal latitude. Britain and France are on the parallel of Labrador, and the line of 41° F. annual mean temperature, which leaves America from the State of Maine in lat. 45°, is carried N. to beyond lat. 60° on the coasts of Norway. The extremes of mean temperature are 58° and 106° F. In the N.E. the air is dry, and the sky clear; in the S. and S.W., where the climate is milder and more oceanic, the air is humid and the rains heavier. The Scandinavian mountains shelter the countries of the Baltic from the cold winds of the N., while the Alps and Apennines arrest the Sirocco from the S. The heaviest rains fall on the western shores, where the S.W. rain-clouds of the Atlantic deposit their loads of moisture. On the coast of Portugal the yearly rainfall, the heaviest in E., amounts to 118 inches; at the foot of the Alps it is 100; on the W. shores of Britain 35-100; and on those of Norway 32. Ireland has no fewer than 208 days in the year during which rain falls. On the other hand, the fall in the Russian plains is only some 15 inches, and there are not more than half the average of rainy days that occur in the W. The fall of snow depends on temperature, and increases from S. to N. There are on an average 1½ days annually at Rome, 10 at Milan, 12 at Paris, 21 at Karlsruhe, 30 at Copenhagen, and 171 at St Petersburg.

Geology and Mineralogy.—The geological formations of E. indicate that the S. and central part of the continent remained submerged under the ocean for ages after the northern portion existed as dry land, and that the Caspian, the Black Sea, and the Arctic Ocean were united in comparatively recent times. The great mountain ranges and Scandinavia, Bohemia, Auvergne, Normandy, and parts of Britain, consist of gneiss, granite, syenite, &c., and the highly-contorted strata of the older Palæozoic formations. The Old Red Sandstone or Devonian occupies vast tracts in Russia, the Rhine basin, and Britain, and crops up continually, like the other primary groups, on the flanks of the southern mountains. The secondary formations occur in England, Denmark, France, W. Germany, Turkey, Greece, the S.E. and N.E. of Russia, and in patches in Spain and Italy. Tertiary strata stretch, with few interruptions, in a broad zone from the S. of the Baltic to the Black Sea, extending in breadth from the Niemen to the Carpathians. To the W. and S. of this belt they cover the basins of all the great rivers, including those of the Danube, Seine, and Thames. The minerals of E. are mainly useful, and are distributed in great abundance. Gold is produced in greatest quantity in the Carpathians and Urals; silver in the Erzgebirge, Harz, Carpathians, and in Scandinavia. The richest iron-mines are those of Britain, France, the Eastern Alps, the Riesengebirge, and the Scandinavian Alps. Lead is plentifully found in the Sierra Nevada, Cornwall, Saxony, and Bohemia; tin in Cornwall; zinc in the Riesengebirge; mercury at Almaden in Spain, and at Idria in Carniola; copper in the Carpathians, Urals, Pyrenees, and in Cornwall and Norway; cobalt, bismuth, and antimony in various parts of Germany. In the Russian government of Perm are found diamonds; the opal in Hungary, and rubies in France. Coal is generally most abundant where iron is found, but especially in Britain, Belgium, and France. Salt-mines are numerous in the Carpathians and Alps, and sea-salt is obtained extensively on the coasts of the Black Sea, &c. In the volcanic regions, as the Solfataras of Naples, Sicily, and Iceland, there is much sulphur, and petroleum occurs in Wallachia, Italy, and Wales. Amber is procured on the Prussian shores of the Baltic. Mineral and brine springs are of frequent occurrence.

Botany.—The flora of E. does not probably contain a single indigenous plant unknown in Western Asia or Northern Africa. It is naturally divided into four great zones:—(1) To the N. of lat. 64°, including Iceland and part of Russia and Scandinavia, is the region of mosses and saxifrages, which has only stunted birches and firs, and along its southern limit some oats, rye, and barley. (2) The N. middle zone, extending from Scandinavia to the N. of France, also known as the region of the *Umbelliferæ*, the predominant trees of which belong to the *Coniferæ* and *Amentaceæ*, as the beech, oak, birch, plane, alder, poplar, willow, and cypress. The pastures are singularly fine, and the forest trees shed their foliage in winter. Besides the species of grain found in the northern zone, there are here wheat, hemp, flax, leguminous plants, apples, pears, cherries, and other northern fruits. (3) The S. middle zone, or region of the central mountain system, where the plains are clad with oaks, beeches, and chestnuts, and the elevations with pines. Here are produced much wheat and wine. (4) The southern or evergreen zone, the region of the *Labiatæ* and *Caryophyllæ*, embracing the three southern peninsulas and the S. coast of France. The vegetation of this zone is famous—its olives and date-palms, its winter flora and its fiery wines. In the extreme S. the orange flourishes, and rice is cultivated in E. Spain and N. Italy. Among the rare fruits are the fig, almond, lemon, pomegranate, and citron. On the other hand, the pastures, which are interspersed with copse of the heath tribe, are less luxuriant than those to the N. of the Alps.

Zoology.—The fauna is on the whole less varied than that of the other divisions of the Old World, but is peculiarly exempt from noxious species. The chief rapacious animals—most abundant in Scandinavia and Western E.—are the bear, wolf, wild boar, and lynx; vast forms are now wholly awanting, while

there are but few reptiles. Domestic animals, however, are plentiful almost everywhere. The buffalo feeds in the marshes of Hungary, Wallachia, and Italy; the reindeer is peculiar to the far North, and the camel thrives near the Black Sea. Many of the quadrupeds yield rich furs. The Barbary ape occurs at Gibraltar. In the Pyrenees and higher Alps are found the chamois, wild goat, and eagle. Among the commoner birds of prey are the vulture, falcon, and kite. The birds are inferior to those of other divisions in size and brilliancy of plumage, but are unexcelled for their sweetness of voice. The northern seas, lakes, and rivers surpass those of the S. in abundance of fish, chief of which are the cod, salmon, mackerel, and herring. Northern E. has a greater number of species of animals; the S. is more abundant in individuals.

Ethnology and Language.—The vast majority of Europeans belong to the Aryan (q. v.) family; only about one-nineteenth are Turanian. The former is distinctly divisible into four great groups—the Celtic in the W., the Greco-Romanic in the S., the Teutonic in the centre, and the Slavonic in the E. Of the Aryan groups, however, the Celt has in many cases failed to retain his original tongue, and therefore linguistically there are now only *three* large divisions of the population—the Teutonic, the Greco-Romanic, and the Slavonic. The first of these, numbering some 89 millions, mainly embraces the Germans, Scandinavians, and English. Constituting the Greco-Romanic there are—(1) the Italic (91⅝ millions), comprising Italians, Spanish, Portuguese, French, Provençal, Walloons, Rhætians (Ladins), Rumans (Wallachians); (2) the Greeks, numbering some 2¼ millions. The Slavs are 83 millions in all, and are divided into E. Slavs—Russians, Cossacks; S. Slavs—Servians, Bosnians, Croatians, Bulgarians, Dalmatians, and Slovens; W. Slavs—Poles, Czechs, Slovaks, Wends, Sorbens. Celtic dialects are now spoken only in the Highlands of Scotland, Wales, Ireland, and Bretagne. The principal Turanian inhabitants of E. are the Turks, the Finns (including the Esthonians, Livonians, Lapps, and Samoyedes), the Calmucks of Russia, the Magyars of Hungary, and probably the Basques of Spain. Gipsies are scattered in large number over E., while there are also some 4$\frac{3}{10}$ millions of Jews. In all, some sixty separate peoples, speaking fifty-three different languages, have been enumerated.

Religions.—All the nations of E. are Christian excepting Turkey, which is Mohammedan. Christianity is split into three main divisions—the Roman Catholic, the Greek, and the Protestant Churches. The Catholic Church has the greatest number of adherents (138,100,000), embracing the majority of the Greco-Romanic nations, about one-half of the Germanic, as well as a large proportion of the Slavs and Celts. Protestantism prevails in Britain, the Netherlands, Prussia, Denmark, Sweden, and Norway. The Greek form of religion is professed in Russia, Greece, and parts of Turkey and Austria. There are 66,000,000 Protestants and 74,630,000 members of the Greek Church. The Mohammedans number 6,500,000, while there are also in the N. idolatrous Lapps and Finns.

For the history of the continent see GREECE, ROME, and the various modern countries of E. Authorities—Schows' *Europa* (1833), Hoffmann's *Europa und seine Bewohner* (8 vols. 1835–40), Brachelli's *Staaten Europa's* (1853), Ritter's *Europäische Vorlesungen* (1863), Klöden's *Handbuch der Erdkunde* (1876).

Euro'tas, the classic name of the modern *Basilipotamo*, a famous river of Greece, which flows through the ancient Laconia, down a beautiful vale with dark gorges, and through a fertile plain into the Gulf of Kolokythia, the ancient *Laconicus Sinus.* Sparta stood upon the right bank of the E., near its confluence with its only important tributary, the Œnus.

Eury'ale, a genus of waterlilies (*Nymphaceæ*), of which *E. ferox* of China and India is a familiar example; the seeds of this species being eaten by the Hindus. The flowers are red, the leaves about 12 inches in diameter, the fruit orange-shaped, containing numerous carpels, and the seeds black. The root-stock, or rhizome, contains starch. The E. is known to have been cultivated by the Chinese for at least 3000 years.

Euryale, a genus of starfishes (*Echinodermata*) belonging to the order *Ophiuroidea*, which also includes the sand-stars and brittle-stars. In E. the body exists in the form of a globose disc, with five obtuse angles, from which the prehensile arms are given off. The arms are long and contorted, but are even more so in the nearly-allied *Asterophyton*, or 'Medusa-head' starfish.


Euryale.

Euryd'ice. See ORPHEUS.

Euse'bius Pam'phili (*i.e.*, E., the friend of Pamphilus) was born about 264 A.D. at Cæsarea, where he spent the most of his life. Till about forty years of age he lived in great intimacy with Pamphilus, Bishop of Cæsarea, who had an excellent library, in which E. studied diligently and profitably. On the martyrdom of his friend he fled first to Tyre and then to Egypt, where he remained till 315, when he returned to Cæsarea, and was elected bishop. In 325 he attended the Council of Nice, in which he took a prominent part, especially in trying to mediate between the Arians and the orthodox Church party. The first draft of the Nicene Creed was made by him, the term *homo-ousios* (importing that the Son was *of the same substance* with the Father, to which he was opposed as savouring of Sabellianism) and the anathemas being added by the Council. E., whose theology corresponds entirely with Origen's, 'was of the opinion that the Son could not be called absolutely eternal, like the Father; that it was necessary to ascribe to him an origin of existence from the Father, since thus only was it possible to hold fast the doctrine of *one* God; and that it was impossible to express the truth *after the manner of men* in any other way than by saying the existence of the Father precedes the existence and the origin of the Son.' E. was offered the patriarchate of Antioch about 330, but declined it. He died in 340. Of the writings of E., his *Chronicon*, a history of the world down to A.D. 328, is chiefly valuable for the extracts it contains from Berosus, Sanchuniathon, and other writers. The first complete edition was published by Mai and Zohrab (Milan, 1818). His most important work is his history of the Church from the death of Christ to 324. But his want of sound critical judgment is so manifest throughout—the history being full of references to spurious documents and names of unknown men, with improbable and ungrounded statements, and stories about miracles—that even his good faith has been called in question. The *editio princeps* of the Greek text appeared at Paris in 1549. The latest and best editions are those of Schwegler (Tüb. 1852) and Lämmer (Schaffh. 1859–62). See Neander's *Geschichte d. Christl. Rel. u. Kirche* (4th ed. Gotha, 1866; Eng. trans. 1858), and Baur's *Epochen der Kirchlichen Geschichtschreibung* (Tüb. 1852).—**E. of Nicome'dia**, Bishop first of Beryta (Beyrout) and then of Nicomedia, and finally (338 Patriarch of Constantinople (died about 340), was the personal friend of Arius (q. v.), whom he attempted to defend at the Council of Nice. He consented, 'for the sake of peace,' to subscribe the creed drawn up at that council, but not the anathemas at the end, in which he was joined by Theognis of Nicæa. For this the two were condemned along with Arius, and banished to Gaul; being also recalled at the same time with Arius, 328. E. was the chief representative of the Semi-Arian (q. v.) party, which took up a middle position between the orthodox and the Arians, adopting the phrase *homoi-ousios* ('of a similar substance') to express the relation of the Son to the Father, from whom they received the name of Eusebians.—**E. of Emisa** (Phœnicia) was born at Edessa, and studied there, and at Alexandria and Antioch, one his instructors being E. of Cæsarea. As early as 312 he was distinguished for scholarship and modesty. He refused the bishopric of Alexandria when Athanasius was deposed in 341, but accepted that of Emisa soon after. He spent the close of his life at Antioch, and died about 360. In reference to the theological controversy of the day, E. probably belonged to the Semi-Arian party, of which his friend E. of Nicomedia was the chief. See Thilo, *Ueber die Schriften des E. von Alex. und des E. von E.* (Halle, 1832).

Eusta'chian Tube. This is a tube leading from the back of the throat to the middle ear or tympanum. Its function is

probably to equalise atmospheric pressure on both sides of the drum of the ear. Closure of this tube from inflammation and enlargement of the tonsils is one of the most common causes of deafness. See EAR.

Eustachian Valve. See FŒTUS.

Eusta'chius, Bartolommeo, a famous Italian anatomist, born early in the 16th c., but whose place and date of birth have not been ascertained, studied at Rome, practised there as physician, and died in poor circumstances in 1574. He enriched almost all departments of anatomical science by his discoveries, upon a number of which, as the *Eustachian tube* and *valve*, his own name has been conferred. Of his works, the *Tabulæ Anatomicæ*, the text of which appears to have been lost, consists of a number of excellent anatomical drawings, and was first published by Lancisi, at Rome, in 1714. Other works were issued under the editorship of Boerhaave at Leyden in 1707, and at Delft in 1736.

Eusta'thius, the most learned man of his age, was born in Constantinople, and flourished in the latter half of the 12th c. Successively monk, professor of rhetoric, and deacon, he died Archbishop of Thessalonica in 1198. His works consist of commentaries on Greek poets, theological treatises, &c., and establish both his learning and his oratorical power. The chief are his Commentaries on the Iliad and Odyssey (Leips. 1825–29), on Dionysius Periegetes (Bernhardy's edition of that author, Leips. 1828), and on Pindar. These commentaries are of the greatest value, as containing extracts from important works that are now lost.

Eusta'tius, St, a Dutch island in the W. Indies, 12 miles N.W. of St Christopher. Area, 190 sq. miles; pop. 2000. It is a mountainous mass of volcanic rock covered with vegetation, but has only one, and that a strongly-fortified, landing-place. The chief productions are maize, sugar, cotton, and tobacco. The island is often visited by severe earthquakes.

Euter'pe (Gr. 'the charming one') was the Muse of lyric poetry . She was represented in ancient works of art with a flute.

Euterpe, a genus of *Palmæ* or palms. Of this group *E. montana*, the mountain cabbage-palm, and *E. edulis*, are familiar species. These plants occur in S. America and the W. Indies. The male and female flowers occur on the same inflorescence. The stems are faintly annulated or ringed; the leaves are pinnate; and the bases of the leaf-stalks are very large, and form sheaths to the stem.

Eutro'pius, a Roman historian belonging to the 4th c. A.D., of whose life almost the only facts known are that he was an imperial secretary under Constantine, that he accompanied Julian in his invasion of Persia, and died probably about 370. He wrote an epitome of Roman history, *Breviarium Rerum Romanarum*, from the early kings to the reign of Jovian, which seems to have been carefully compiled, and which is composed in a succinct and singularly pure and simple style. It was once very popular, and was much used as a school-book, for which it was seemingly intended. The *editio princeps* appeared at Rome in 1471; the best modern editions are by Grosse (Halle, 1813), Ramshorn (1847), and Dietsch (1849).

Eu'tyches, abbot of a monastery at Constantinople in the 5th c., who in seeking to combat Nestorianism fell into heresy himself. When the orthodox doctrine of the perfect equality of the Son with the Father had been established at the Council of Nice (325), the next difficulty was the union of this perfect God with the man Jesus; and Apollinaris (q. v.), holding the idea of a God-man to be a logical monstrosity comparable to a minotaur, affirmed that the Logos took the place of the mind in Jesus, whose soul and body alone were human, so that there was in reality but one nature in Jesus. In opposition to this the orthodox doctrine was next established (Council of Constantinople, 381) of the complete and real manhood of Jesus. But now the divine and the human nature, in being distinguished so carefully, came to be separated; they were held by some to be conjoined but not united. Nestorius, for instance, separated them so far as to refuse to call Mary the mother of God, which she was declared to be at the Council of Ephesus, 431. That council decided that in Jesus the two natures were not merely annexed but united. It was in pressing this doctrine one step too far that E. and his partisans revived the Monophysism of Apollinarius. E. declared that though there were two natures before the incarnation, there was but one after. He was also wont to call the body of Christ the body of God, and though he did not deny to him a human body, yet from a feeling of reverence he would not call it the same in essence as other human bodies. The Council of Chalcedon (451) condemned E., and defined the orthodox doctrine to be that in Jesus were united the two natures of a true God and a perfect man, 'unconfounded, unchanged, undivided, inseparable.' After this E. disappears from history, but his doctrines are still held by the Armenian and Coptic Churches. See Neander's *Geschichte d. Christl. Rel. u. Kirche* (4th ed. Gotha, 1866; Eng. trans. 1858), and Reville's *Hist. du Dogme de la Divinité de Jésus Christ* (1870).

Eux'ine (Gr. *euxeinos*, 'hospitable') is a name of the Black Sea. The earliest Greek navigators called it Axeinos (or 'inhospitable'), from the savage tribes that surrounded it; but when these had been civilised by commerce, they changed the name to Euxeinos.

Evan'der, of Pallantium, in Arcadia, was the son of Hermes by the nymph Themis, or according to Roman legend by the prophetess Carmenta or Tiburtis. Sixty years before the Trojan war, E. sailed for Italy with a Pelasgian colony. He landed on the bank of the Tiber at the foot of the Palatine, and there built the city Pallantium, from which, according to Varro, the names Palatium and Palatinus are derived. He taught the people laws, music, and the art of writing. He received Hercules after the conquest of Geryon, and raised altars to that hero, as well as to the Lycæan Pan, Demeter, and Poseidon, and assisted Æneas on his arrival in Italy. Divine honours were paid to E. at Pallantium in Arcadia and on Mount Aventine.

Evangel'ical Alliance, The, 'for the union and co-operation of Christians throughout the world,' was organised in London in 1846, at a meeting of some 800 professing Christians—Episcopalians, Methodists, Presbyterians, Independents, Baptists, Moravians, Lutherans, and others, and has taken root in many countries. Branches now exist in Great Britain and the Colonies, France, Belgium, Switzerland, Germany, Sweden, Norway, Italy, Greece, Turkey, Syria, Australia, India, New Zealand, and the United States. The chief object of the E. A. is 'to exhibit the unity of the one Church of God in doctrine, mutual recognition, and Christian co-operation for the advancement of evangelical truth throughout the world,' its motto being 'Unum corpus sumus in Christo.' The basis of the Alliance is that it is to be composed of such only as hold evangelical views in regard to the following points of doctrine:—(1) The divine inspiration, authority, and sufficiency of the Holy Scriptures; (2) the right and duty of private judgment in the interpretation of the Holy Scriptures; (3) the unity of the Godhead, and the Trinity of Persons therein; (4) the utter depravity of human nature in consequence of the Fall; (5) the incarnation of the Son of God, his work of atonement for sinners of mankind, and his mediatorial intercession and reign; (6) the justification of the sinner by faith alone; (7) the work of the Holy Spirit in the conversion and sanctification of the sinner; (8) the immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked; (9) the divine institution of the Christian ministry, and the obligation and perpetuity of the ordinances of Baptism and the Lord's Supper.

Since the formation of the E. A. general conferences, to which Christians of all nations were invited, have been held in London, 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873. See an *Historical Sketch of the Origin, &c., of the E. A.*, and a *Brief Statement*, &c. (1875), by Rev. James Davis, secretary; *Proceedings*, &c., *of the E. A. Conference held at New York*, 1873, by Schaff and Prime (1874).

Evangelical Union, The, is a denomination of Christians which may be said to have been founded by Rev. James Morison, from whom it sometimes gets the improper title of Morisonians. Mr Morison, minister of a congregation of the United Secession Church at Kilmarnock, was deposed for heresy in 1841, chiefly on the charge of teaching the universality of the atonement, and the ability of man to believe the gospel. His

father, Mr Robert Morison, United Secession minister at Bathgate, was also deposed in 1842, and A. C. Rutherford (Falkirk) and John Guthrie (Kendal) in 1843—all for holding similar views. These men and 'others, principally elders and delegates from Christian Churches,' met at Kilmarnock in 1843, at which conference a 'statement of principles' was adopted as the basis of an association, which was forthwith formed under the desigation of the E. U., 'for the purpose of countenancing, counselling, and otherwise aiding one another; and also for the purpose of training up spiritual and devoted young men to carry on the work and pleasure of the Lord.' The E. U. does not profess to be based on any peculiar or distinctive Church polity, but to be a protest against certain of the leading dogmas of Calvinism; in short, those belonging to it take up the position of theological Nonconformists in Scotland. Their theology affirms:—I. As regards the divine purpose in redemption—(1) The universal fatherhood of God, and in consequence his desire to save all men: in opposition to the Calvinistic election; (2) the universal atonement of Christ, making the salvation of every man possible: in opposition to an atonement for the elect only; (3) the universal work of the Holy Spirit, or its desire to reach all men, and its sufficiency in every case to secure conversion: in opposition to the limitation of its work to the elect. II. As regards the application—(1) That the will of man must be in the matter of his salvation free and active: in opposition to the Calvinistic doctrine that man by the Fall 'hath wholly lost all ability of will to any spiritual good accompanying salvation;' (2) that a man is regenerated through faith, not in order to it; (3) that a man is elected to salvation 'through sanctification of the Spirit and belief of the truth,' and not predestinated by God unto life 'without any foresight of faith or good works, or any other thing in the creature, as conditions or causes moving him thereunto.'

There are now (1876) in Scotland between eighty and ninety congregations belonging to the E. U., or affiliated therewith, that is, sympathising with it in doctrine, and co-operating in Christian work without being formally connected. In England there are few churches belonging to the Union, but a large number of ministers, its ministers being eligible for Congregational churches there. See the *E. U. Annual*, a *Doctrinal Declaration* published by the Conference of 1858; *The Position and Theology of the E. U.*, a sermon by Rev. A. M. Fairbairn.

Evan'gelist means (1) 'a bringer of good news;' (2) in the New Testament, a preacher of the gospel, *i.e.*, not a settled pastor, but an itinerant preacher or missionary (2 Tim. iv. 5), the pastor being called presbyter or elder. Eusebius speaks of the E. as if he had been a colporteur of the written Gospels, which he could not have been at the time he speaks of. This idea led to the later meaning attached to the name of the E. *par excellence*, as (3) the writer of a Gospel. (4) In still later liturgical language the E. was the reader of the Gospel for the day.

Ev'ans, Lieutenant-General Sir De Lacy, G.C.B., a distinguished British soldier and Liberal politician, was born at Moig, in Ireland, in 1787; entered the army in 1807; distinguished himself in the Peninsular war, especially at Vittoria and Toulouse; in 1814-15 served in N. America, and was severely wounded at New Orleans; in 1815 was at Quatre-Bras and Waterloo as aide-de-camp to General Ponsonby. In 1831 he was elected member for Rye, and in 1833 for Westminster. In 1835 he accepted the command of the British Legion, of 10,000 men, raised to maintain the throne of Isabella II. of Spain against the Carlists, and was victorious before San Sebastian, Pasages, and on the heights of Amozagana, and closed the campaign by the storm and capture of Irun. He was defeated for Westminster in 1841, but was re-elected in 1846, and retained his seat till 1865, when he retired from public life. In June 1854 he was raised to the rank of lieutenant-general in the British army, and in the Crimean war of 1854-55 commanded the second division of the British forces, fighting with signal intrepidity at Alma and Inkerman. Failing health forced him to return to England in the beginning of 1855, when he received the thanks of Parliament for his services in the field. He received the Grand Cross of the Bath, the Grand Cordon of the Legion of Honour, and the degree of D.C.L. from Oxford. E. died January 9, 1870.

Ev'ansville, an important city of Indiana, U.S., on the Ohio, 50 miles above the confluence of the Wabash. It has a U.S. marine hospital and several public halls. As the southern terminus of the Wabash and Erie Canal, E. has great facilities for trade and navigation. There are flour-mills, iron-foundries, and manufactures of wool, leather, &c. The town has four daily newspapers. Pop. (1870) 21,830.

Evapora'tion is the conversion of a liquid at its surface into the gaseous form. Dalton showed that if a liquid be permitted to evaporate in a vacuum, the E. goes on till a certain quantity of vapour is formed, whose pressure depends upon the temperature. When a liquid is vaporised, heat is absorbed, and therefore must be abstracted from surrounding matter or from the liquid itself. For instance, if a thermometer bulb be dipped in ether and then exposed to the air, the ether is rapidly evaporated, the heat necessary for this being obtained from the mercury, whose temperature is therefore lowered. Again, if a tube terminating at each end by a bulb be taken, with a little water in the one bulb and water vapour in the rest of the tube, by simply immersing the other bulb in a cold liquid a condensation of the vapour there takes place, and this necessitates an E. and therefore cooling of the water, which is thus made *to freeze by its own E.* Liquids which vaporise rapidly at ordinary temperatures are said to be volatile, and every liquid increases in volatility as its temperature approaches that of its boiling-point. Pressure also has a very great effect upon E., so much so that by a rapid diminution of pressure a liquid may be made to boil at a temperature considerably below its true boiling-point. When it is considered how great a proportion of the earth's surface is liquid, it is evident that E. must play an important part in the economy of nature. The air always contains water vapour in varying quantities, depending on the temperature and pressure. When air saturated with water vapour is cooled, the vapour is condensed and forms clouds of rain, snow, or hail, according to the circumstances in which it has been cooled. This physical E. is so intimately involved in other meteorological operations that for further information in this connection reference is made to such articles as CLIMATE, CLOUDS, DEW, WINDS, &c.

A very beautiful explanation of E. is furnished by the modern Molecular Theory (q.v.) of the constitution of matter. According to this theory the average velocity of the molecules of a liquid is less than that of its vapour; but some of the former may be moving with velocities equal to, or even greater than, the average velocity in the vapour. If such a molecule should be at the surface and be moving *from* the liquid, it will fly off into space as a vapour molecule. Also, a vapour molecule striking the liquid may become part of the liquid if entangled among the liquid molecules. Such is the theory of E. and condensation. The former depends on the temperature and extent of surface of the liquid, the latter upon the temperature and pressure of the vapour. If the liquid be evaporated in a closed vessel, things will go on until the pressure of the vapour is sufficient to render the number of molecules condensed equal to the number evaporated. At this stage E. is usually said to cease, but upon the theory it is going on as fast as ever, only it is neutralised by an equal condensation.

Eve is the name given in the Hebrew scriptures to the first woman, who was so called by Adam, according to the narrative, 'because she was the mother of all living' (Heb. *khavah*, 'life' or 'life-maker'). See ADAM.

Evec'tion (Lat. *evectio*, 'a carrying out'), the name applied by Bullialdus to an inequality, first noticed by Hipparchus, which consists in the alteration of the eccentricity of the lunar orbit, produced by the difference of the sun's attractions upon the moon at its apogee and perigee—a difference which depends upon the relative positions of the lunar line of apsides and the earth's radius-vector.

Eve et Treve (Scotch law), a term for slaves or servants. See COLLIERS AND SALTERS.

Ev'elyn, John, an English author and man of science, was born at Wotton, Surrey, October 31, 1620. Educated at Balliol College, Oxford, he seems to have been intended for the law, for he studied at the Middle Temple (1640-41); but the civil war, in which he took the side of the Royalists, compelled him to travel for a time, particularly in France and Italy. Assisting

in the Restoration of 1660, he was received with favour at the court of Charles II., became one of the founders of the Royal Society in 1662, and at its request, when the English Naval Commissioners dreaded a scarcity of naval timber in the country, wrote (1664) *Sylva, or a Discourse on Forest Trees, and the Propagation of Timber in His Majesty's Dominions*, which induced landholders to plant a great number of young oak-trees, from which were obtained the war-ships of the next century. He died 20th February 1706. E. wrote popular works on various subjects, such as sculpture, architecture, &c., but will be chiefly remembered as perhaps the first in England to treat gardening and planting scientifically, and for his *Diary*, which is probably unsurpassed for the curious and minute information which it gives regarding society in the latter half of the 17th c. It was published under the editorship of W. Bray in 1818, and has gone through several editions, of which the chief are one in 4 vols. by the late John Forster (1859), and a reprint of the second (1870).

Eve'ning Primrose. See ŒNOTHERA.

Ev'erett, Alexander Hill, an American author and diplomatist, was born at Boston, Massachusetts, March 19, 1790. He graduated at Harvard in 1806, studied law in the office of John Quincy Adams, and in 1809 accompanied him on his mission to Russia. He was appointed minister at the Hague in 1818, and at the court of Spain in 1825. Returning to the United States in 1829, he became editor and proprietor of the *North American Review*. In 1845 he was sent as minister to China, and died in Canton, June 28, 1847. E.'s works, which exhibit much learning, varied knowledge, and fine talent, are *Europe, or a General Survey of the Principal Powers* (Lond. and Bost. 1822); *America, or a General Survey*, &c. (Phil. 1827); *New Ideas on Population* (Lond. and Bost. 1822); *Essays* (Bost. 1845 and 1847).—**Edward E.**, brother of the foregoing, was born at Dorchester, near Boston, Massachusetts, April 11, 1794. He studied at Harvard College, and graduated in 1811. At twenty years of age he became pastor of a Unitarian church in Cambridge, and soon gained distinction by his brilliant pulpit efforts. He appeared as an author in 1814 with a *Defence of Christianity*, and next year was elected Eliot Professor of Greek in Harvard College. To prepare himself for this position he resided four years in Europe, associating with some of the most distinguished men—M. Cousin regarding him as 'one of the best Grecians he ever knew.' E. returned to the United States in 1819, became member of the House of Representatives in 1824, and Governor of Massachusetts in 1835. He was made minister at the court of St James in 1841, became President of Harvard College in 1845, was appointed Secretary of State in 1852, a United States senator in 1853, and died 9th January 1865. E.'s *Orations and Speeches* (4 vols. 1850-68) are a brilliant embodiment of his public career. Although not a profound statesman, he was one of the most eloquent and accomplished of American orators.

Ev'ergreens, a name popularly applied to such plants as retain their foliage and verdure throughout the year, this property being chiefly due to the thickness of the leaf-substance, and to the retardation or absence of the chemical changes in virtue of which the leaves of other plants fall and wither. Of E., firs, heath, rhododendrons, laurels, holly, ivy, box, privet, some oaks, bays, myrtles, &c., are well-known examples. E. are much in request for the decoration of garden policies, churches, &c.

Everlast'ing Flowers, the name given to certain kinds of flowers belonging to Composite plants, from their dry, firm structure, which enables them to resist the process of decay for a long period. The species of the genus *Gnaphalium* (*e.g.*, *G. orientale*) are much in request as E. F.; and species of *Helichrysum* are also termed E. F. from their durability. The flowers of *G. orientale* are used by the French in making *immortelles* to decorate tombs. The species of *Helichrysum* are chiefly natives of Africa, but some (*H. arenarium*) grow in Southern Europe.

Ev'ersley, Viscount, Charles Shaw Lefevre, an English politician, was born February 22, 1794, educated at Winchester School and Trinity College, Cambridge, entered Parliament in 1830, and from 1832 to 1857 represented N. Hants. In May 1839 he was chosen Speaker of the House of Commons after the elevation of Mr Abercromby to the peerage as Lord Dunfermline, and this post he held uninterruptedly for eighteen years, the Conservative ministry of Sir Robert Peel having offered no opposition to his re-election. A fine and dignified presence, affable manners, perfect acquaintance with the forms of the House of Commons, and absolute impartiality, made Mr Lefevre one of the most popular and successful of Speakers. When he retired in 1875 with a peerage as Viscount E. and a pension of £4000, his retirement was universally regretted. E. is a D.C.L., and has held numerous posts, including those of High Steward of Winchester, Governor of the Isle of Wight, Commissioner of Church Estates, and (in 1859) Ecclesiastical Commissioner.

Eves'ham (Old Eng. *Eofesham*, 'the dwelling by the river's brink'), a market-town of Worcestershire, 15 miles S.E. of Worcester, and a station on the West Midland Railway. It stands on a slope above the Avon, in the vale of E., which is famous for its beauty and fertility. The chief buildings are the churches of All Saints (13th c.) and of St Lawrence. Of the abbey, only the clock-tower, 110 feet high, remains. There are manufactures of agricultural implements. E. arose from a monastery founded in 709. Here Prince Edward, afterwards Edward I., defeated Simon Montfort, August 4, 1265. Till 1867 E. returned two members to Parliament; since then, only one. Pop. (1871) 4888.

Evic'tion, in Scotch law, is the dispossessing one of property, heritable or movable, in virtue of a preferable title in the person of him by whom the E. is made. The dispossessed party will be entitled to institute an action against his author, the value of the claim being regulated by the nature and extent of the Warrandice (q. v.). In England the possessory action by which the title to lands and tenements may be tried and possession recovered is called Ejectment.

Ev'idence, Le'gal, may be defined as any matter of fact tending to affirm or disaffirm the alleged existence of some other matter of fact. It may be in writing or by testimony of witnesses. Written proofs consist of records, ancient deeds, and wills thirty years old, which prove themselves; but modern deeds and other writings must be attested and verified by the parole testimony of witnesses. See PAROLE PROOF.

The rule in all trials is that the best evidence must be produced which the case admits of, for if it be shown that better evidence exists than that which is produced, then the non-production causes a presumption that it would have disclosed some hidden falsehood. Thus it would not be allowed to prove the terms of a lease by an attested copy or by parole evidence, the lease itself being proved to be forthcoming; but the deed being shown to be lost, then secondary evidence is available.

Letters are evidence *against* the writers but not for them. Entries in family Bibles and other books by parents or heads of families are good evidence of the facts recorded. A receipt *in full*, when obtained without fraud or collusion, is conclusive against the party who grants it. An account in a tradesman's books, if supported by collateral proof of fairness and regularity, would probably be sufficient evidence of debt. In England the law limits this proof to transactions within *one year* before the action brought, unless between merchants in the usual course of trade. In Scotland the Act 1579, c. 83, introduces a triennial prescription in merchants' accounts. See PRESCRIPTION.

The Act 14 and 15 Vict. c. 99, known as Lord Brougham's Act, amended by 16 and 17 Vict. c. 83, and 32 and 33 Vict. c. 68, makes some important changes relative to compelling interested persons to give evidence, and as to the admission and verification of documents. The second Act above named renders the husbands and wives of parties to any judicial issue or inquiry competent and compellable witnesses on behalf of any party to the suit. But a husband is not a competent witness against his wife, nor a wife against her husband, in criminal procedure or in case of adultery. During marriage, neither husband nor wife can be compelled to disclose any communication made by the one to the other.

The Act 32 and 33 Vict. c. 48 allows the judge, in place of the former oath, to administer to a witness this declaration:—'I solemnly promise and declare that the evidence given by me to this court shall be the truth, the whole truth, and nothing but the truth.' Any one giving false evidence after making this declaration is liable to the penalties of perjury.

No counsel, attorney, or other person *professionally* connected with the cause can be compelled to disclose matter confidentially intrusted to him. But lawyers not engaged in the cause, physicians, divines, servants, and friends can be compelled to divulge all matter relevant to the issue, though it has been imparted to them in the strictest professional confidence, and however delicate its nature. Act 17 and 18 Vict. c. 34 empowers the courts of law in England, Scotland, and Ireland to compel the attendance of witnesses *out* of their jurisdiction; witnesses not appearing to be punished by the court of the county in which the process has been served in the same manner as in disobedience to a writ of Subpœna (q. v.). The superior courts at Westminster and Dublin, the Court of Session in Scotland, and the supreme court in any colony or possession of her Majesty, are authorised on due application to issue an order to examine witnesses in suits pending before any tribunal in her Majesty's dominions. See WITNESS.

E'vil (Old Eng. *yfel*, Pl. Deut. *oevel*, Dut. *euvel*, Fris. *evel*, Ger. *übel*, Old High Ger. *ubil*, Mœso-Goth. *ubels;* the root is uncertain) is a term of theological origin, partially adopted into the language of common life, and usually understood to mean whatever is contrary to our ideas of moral rectitude and tends to interfere with the general happiness of mankind physically, morally, and socially. Traces of something wrong in all the departments of human life, that seems irreconcilable with the rule of infinite power, wisdom, and goodness in the universe, are not far to seek nor hard to find. Besides the more directly physical evils, such as the havoc caused by hurricanes of wind on sea and land, earthquakes, explosions, epidemics, &c., we find, *e.g.*, tribes of human beings living for centuries in brutish ignorance, and finally left to perish by pestilence and internecine war. We have the sufferings and sorrows of the multitudes who are born into the world with constitutions predisposing them to physical disease and pain, and to moral obliquity, and who get in their upbringing a special training to vice, cruelty, and crime. We see the talented, the useful, and the benevolent cut down in the prime of life, while the stupid and the useless are spared. We see on the one side honesty in rags, innocence ruined and oppressed, martyrs imprisoned, tortured, and put to death; and on the other knavery and tyranny stalking in prosperity and honour. The mystery of the existence and cause of all this is one which men have been trying to explain ever since speculation began. Two great modes of solution have been attempted, the *Dualistic* and the *Pantheistic*. 1. Under the former may be classed:—(1) The Eastern speculators, who accounted for E. in the world by the innate opposition of matter to the divine will. By the one absolute, uncreated, universal Being—according to the Zend-Avesta, the sacred books of the ancient Parsees—were created two deities, the gods of light and darkness, of wisdom and ignorance, of good and E.; the latter coming first, and the former being produced as a remedial principle to regulate the work of the latter. The Gnostic sects of the early Christian Church adopted these dualistic notions from the East, which were fully developed by (2) the Manichæans, who either ascribed the origin of E. to the Demiurgus (the creator of the material world, himself created by the Eternal), or maintained that it was inherent in matter. The ascetic practices, so common among Christians at the time, indicate the prevalence in the Church of the view akin to this, that the body is the seat and organ of sin. (3) The Christian fathers, who, generally speaking, traced the origin of E. to the rebellion of the human will against the will of God, although some of them ascribed it to sensuality, and Athanasius, as well as Origen, regarded moral E. as something negative. Augustine arrived at the same conclusion by a different road. (4) Another theory accounts for E. on the principle of necessary opposition or antagonism. As there is no rest without fatigue, no pleasure without pain, &c., so there could be no virtue without vice. Moral goodness is the mastery over moral evil. 2. The *Pantheistic* theory of E. depends of course on its theory of ontology. This system, the earliest known origin of which was in India, teaches that the eternal, infinite Being creates by self-evolution, whereby he becomes and is all existence. Accordingly, as it is expressed (1) by the modern philosophers of this school (*e.g.*, Spinoza), E. is only limitation or modified good, for all modes of action are all alike modes of God's activity. Thus the less of being the less of good, and E. is what is finite, for the finite is simply the negation or limitation of infinite being. We may also note another theory associated with the name of Leibnitz, who resolves sin into privation, and refers it to the necessary limitation of a creature. God could not create a world without sin, because he could not make creatures absolutely perfect. (2) The theory held by Bolingbroke and the sceptics of his time, who account for the origin of E. on the æsthetic principle of the proportion of parts in the scale of sentient being. As animal life is graduated from the highest intelligence down to the point at which the animal seems half a plant, so in the moral world 'there is a ladder whose top reaches the loftiest unselfishness, and whose rounds gradually descend to the grossest forms of moral life.' (3) The fatalistic theory of the Deists of last century, which Butler sought to refute. As the universe is the necessary outcome of the necessary existence of God, all the orders of existence in the universe, which must also be necessary, are fated to form links in one chain of eternal and unalterable necessity, and to be as they are at any given stage of their development.

The great difficulty in the way of accounting for the existence of E. lies in the two doctrines of the existence of a personal God of infinite power, wisdom, and goodness, and of the free, self-determining action of the human will. Accordingly most of the theories enumerated above try to get rid more or less of one or other of these two doctrines; some of them of both. Those who give up the personality of God find a solution of the problem to their own satisfaction in maintaining that by so doing they render E. and sin in the ordinary sense *meaningless*, because these terms point back to a period in the childhood of mankind when human duty was held to consist in obeying a series of positive commands, and that what they represent are merely the results of imperfection or ignorance. Of all the solutions of the mysterious problem given by those who retain the two conditions, not one amounts to a real explanation of the difficulty. Perhaps no adequate explanation is possible to finite beings in their present condition. But as science more and more fully reveals the beautiful evolution by which from the lowest forms in nature endless varieties have been produced, as history gradually recognises in civilisation the outcome of a perpetual struggle against obstacles to its advance, a hope arises in the human mind that there is in the dread phenomena of E. a purpose which may one day be seen to be not incompatible with the wisdom and goodness of an Almighty Being. See Hodge's *Syst. Theology* (1873); Naville's *Problem of E.;* Hunt's *Essay on Pantheism* (1866); T. Parker's *Sermons on Providence;* Neander's *Geschichte d. Christl. Rel. u. Kirche* (*Manichæism*, &c.).

Evil Eye. The belief that the human eye can put forth powers of positive mischief, can blight and destroy everything that has life, appears to have prevailed universally over the ancient world—in Europe, Asia, and Africa. It is still prevalent in heathen countries, and maintains its ground to some extent in Christendom. The Greeks used the word *baskainō*, the Latins *fascino*, to describe this baleful influence. In Italian we have the *mal occhio*, in French the *mauvais œil;* and most languages bear witness to the existence of the belief. We meet with the phrase 'eye-bitten cattle,' 'eye-biting witches,' in treatises on the subject, and it was an old belief in England that those persons who 'had two balls, or two *blacks* in the apple of the eye' (what is called a double pupil), possessed much of this baneful power. Hence probably the common saying, 'No one can say that black is the white of my eye'—can say that I have an E. E. The number of amulets, charms, and spells 'defensative' or 'counteractive,' recommended in books, ancient and modern, against the E. E. is very great. Bathing the eye with saliva is thought very effective in neutralising the destructive influence for a time, and it is still common when any object of great value or beauty is to be viewed to hear one person say to another, 'Bathe your eye before you look at it;' and 'spitting three times in the eye' is sufficient to undo the strongest spell. In England 'turning the coal,' as it is called, will not merely neutralise the evil, but actually turn the tables on the witch, and make her feel as if a red-hot coal lay on her heart until she withdraws her charms. In Scotland the 'mountain ash,' or rowan-tree, is the great preservative or 'saining' agent. A piece of this wood worn on the breast keeps a man scatheless. A branch of rowan laid above the byre-door will ordinarily protect the cattle, and in special circumstances a twig twisted in the

hair of the cow's tail will guard any individual cow; or, laid under the churn, will ensure its yielding the due proportion of butter.

The belief in an E. E., though it has assumed a multitude of grossly superstitious forms, has doubtless originated, like many other superstitions, in the exaggeration of a natural fact. The power of the eye is in reality almost unlimited; some men can read unerringly the thoughts of others by a single glance. This mysterious capability in times of wide-spread ignorance would naturally engender a thousand crude fancies in the breasts of the common people, which astute and cunning men would easily turn to their advantage.

Ev'olute and In'volute. If a stretched inextensible cord be supposed wound round a given plane curve, each point of the cord, when unwound under tension, will describe a curve, of which the original curve is the E. These evolved curves again are *involutes* of the original curve. It is apparent, then, that a given plane curve has an infinite number of similar involutes, but has only one E. A kinematical consideration of the above method of description shows that tangents of a curve are normals to its I., and normals to a curve are tangents to its E.; and that an E. may, therefore, be defined as the locus of the ultimate intersections of the normals, or, in other words, the locus of the centres of curvature. The circle has no E., or rather its E. is reduced to a single point. Its I. is a spiral, and is of some practical importance in the making of toothed wheels. The involutes of the cycloid and equiangular spiral are geometrical curiosities, as being similar and equal cycloids and spirals. The analytical methods of investigation of these derived curves will be found in most text-books on the elements of the differential and integral calculus.

Evolu'tion and Involu'tion are two inverse algebraic operations, the latter concerning itself with the *raising* of numbers or expressions to *powers*, the latter with the *extraction of roots* of similar quantities. Thus $a \times a \times a$ is a raised to the third power, and is written a^3; and in the same way a^n is unity multiplied by a $n$times. This is a case of I., and is the case which occurs constantly in arithmetic. In algebra, however, the term has a far wider significance, being the expression of the sum of n quantities raised to the mth power as the sum of a series of determinable quantities, or in other words, the expansion of

$$(a_1 + a_2 + a_3 + \quad . \quad . \; . + a_n)^m.$$

The binomial theorem

$$(a + b)^n = a^n + na^{n-1}b + \frac{n^2}{1 \cdot 2} a^{n-2}b^2 + \; . \; . \; . \; .$$

is a special case of I., and one of very frequent occurrence, and of great importance in both pure and mixed mathematics.

E. is usually called in arithmetic the *extraction of roots;* that is to say, given any number or expression, it is required to find that quantity which when raised to a given power will be the given quantity. It thus requires in the first place a knowledge of I.; and this knowledge is sufficient to obtain the method of solution. We shall here indicate the general method by the consideration of the special case presented by the *cube root*. From I., we know that

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3.$$

The cube root, then, of the right-hand expression is $a + b$, the first term of which is a, the cube root of a^3.

$$\begin{array}{r|l} & a^3 + 3a^2b + 3ab^2 + b^3 \; (a + b \\ & a^3 \\ 3a^2 + 3ab + b^2 & \overline{\qquad 3a^2b + 3ab^2 + b^3} \\ & \qquad 3a^2b + 3ab^2 + b^3 \end{array}$$

Subtracting a^3, we have three terms remaining for which we must find a divisor such that the quotient may be b. The first term of this divisor is evidently three times the square of the first term of the answer; and to this must be added three times the product of the first and second (which latter is obtained from consideration of the trial divisor $3a^2$) and the square of the second. If there be a third term in the answer, the first two must be taken as one term and treated in the same way. The application to arithmetic is easy, if the value of each figure in the number, as to whether it represents units, tens, hundreds, or thousands, be always kept in view. The full treatment both of the square and cube roots, which are alone of any practical importance, may be found in any treatise on elementary algebra.

Evolution Theory, in its widest signification, is an hypothesis which regards all nature, physical and biological, as the result of a development from the general to the special, from the simple to the complex; at the same time viewing human progress, the growth of language, literature, moral and religious sentiments, science, and art, as but the higher and ultimate results of the same natural laws acting through endless variations. The idea of evolution is truly philosophical, but no full explanation of its working has as yet been given, notwithstanding numerous attempts. Darwin's theory of natural selection (see DARWINIAN THEORY) may account for the transmission and perpetuation of useful variations, but it cannot account for variation itself; while Herbert Spencer's bold attempt to produce from a homogeneous distribution of matter a heterogeneous but dynamically stable universe, with the subsequent development of life, instinct, reason, and social and moral qualities, is unsatisfactory, and even in certain instances self-destructive in its reasoning.

Evolutions, Military, include all the movements of troops under command, in times of peace and war. The tendency of the development of the art of warfare is to simplify E.; and in modern Drill (q. v.) the soldier is in many cases intrusted to perform some of them in the manner which, in certain circumstances, seems to him the best. See TACTICS.

Ev'ora (anc. *Ebora* and *Liberalitas Julia*), the capital of Alemtejo, Portugal, situated on a high plain, 73 miles E. by S. of Lisbon by railway. It is the see of an archbishop (since 1541), was often in former times the residence of the king and the seat of the Cortes, and has two ruined forts, a large Gothic cathedral (1186), several convents, and a library of 50,000 vols. Its manufactures are chiefly leather and ironwares. Pop. (1864) 11,965. E. was captured by Sertorius in 80 B.C. Taken by the Arabs in 712, it was recovered in 1166. The Roman antiquities of E. have attracted much attention. They consist chiefly of a temple of Diana, with Corinthian columns, now used as a slaughter-house, and an aqueduct, part of which was demolished in 1875. At the end of the aqueduct is an exquisite tower, one of the finest specimens of Ionic architecture in the Peninsula.

Ev'remond, Charles de Marquetel de St Denis, Seigneur de St, a famous wit and epicurean of the 17th c., was born at St Denis du Guast, near Coutances, April 1, 1613. He was the son of a baron, and after studying in a Jesuit college, entered the army, where his wit and bravery won him the friendship of Turenne, Condé, and other distinguished men. Condé gave him a lieutenancy, which he lost, along with the prince's favour, for indulging in indiscreet raillery. At the time of the Fronde he satirised the king's enemies, but shortly afterwards was imprisoned during three months for a rash witticism on Mazarin, and his sprightly sallies against the treaty of the Pyrenees compelled him to flee to England in 1662. There he became one of the brightest ornaments of the giddy Restoration society. Charles II. gave him a pension of £300. William III. was also charmed with E., who, though pardoned by Louis XIV. in 1789, remained in England till his death at London, September 20, 1703. His letters are scarcely surpassed, even in French literature, for polished and easy vivacity. See Des Maizeaux's edition of his works (Lond. 1705).

Évreux' ('on the waters,' anc. *Mediolanum*, later *Eburovices*), the capital of the department of Eure, France, on the Iton, 67 miles W.N.W. of Paris by railway. It is the seat of a bishop, and has a fine cathedral of the 11th c., a clock-tower of 1417, an episcopal palace (1484), a theatre, a botanic garden, and elegant promenades. The manufactures are cotton and woollen fabrics, leather, liqueurs, &c. Pop. (1872) 13,350. E. was pillaged by Rollo and his Northmen in 892, and was burned by Henry I. of England in 1119. In the reigns of Henry V. and Henry VI. it was repeatedly in the hands of the English.

E'wald, Georg Heinrich August von, one of the most illustrious biblical scholars of the 19th c., was born at Göttingen, 16th November 1803, studied at the university of his native town, where he became in 1827 extraordinary, and in 1831 ordinary, Professor of Philosophy. In 1835 he was appointed Professor of the Oriental Languages. Travels in search of Oriental MSS. took him in 1826, 1829, and 1836 to Berlin, Paris, and Italy. As one of the seven Göttingen professors who protested against the abolition of constitutional law and liberty in Hanover, he was dismissed from his chair, 12th December 1837, and thereby obtained leisure for a visit to England. In 1838 he accepted a

call as ordinary Professor of Theology to Tübingen, was ennobled by the King of Würtemberg in 1841, and returned to Göttingen in 1848; and in the North German *Reichstag* of 1867 was conspicuous by his Hanoverian and anti-Prussian policy. E.'s works on the Hebrew language, his exegesis of the Old Testament, and his treatment of Jewish history in this department of learned labour, have that supreme merit which the Germans call 'epoch-making.' They have moulded the critical conceptions of all subsequent scholars, and have left a lasting impress on biblical study. E. is probably the greatest genius that has adorned modern German theology. The most notable of his numerous writings are his *Kritische Grammatik der Hebr. Sprache*, repeatedly recast under the title of *Ausführliches Lehrbuch der Hebr. Sprache* (7th ed. Gött. 1863), *Hebr. Sprachlehre für Anfänger* (3d ed. Gött. 1862), *Hohe Lied Salomo's* (Gött. 1826), *Die Poetischen Bücher des Alten Bundes* (4 vols. Gott. 1835-37), *Die Propheten des Alten Bundes* (2 vols. Stutt. 1840), the *Geschichte des Volkes Israel* (7 vols. Gött. 1843-59; 3d ed. 1864-69), *Die drei ersten Evangelien* (Gött. 1850; new ed. 1871-72), *Die Sendschreiben des Apostels Paulus* (Gött. 1857), *Die Johanneischen Schriften* (2 vols. Gött. 1861-62). E. also thoroughly studied the other Oriental languages, especially the Arabic, Aramaic, Ethiopic, Phœnician, Persian, and Sanskrit. In some respects his *Grammatica Critica Linguæ Arabicæ* (2 vols. Leips. 1831-33) is still unsurpassed. He has made numerous contributions to Oriental and biblical literature in the *Abhandlungen zur Orient. und Biblischen Literatur* (vol. i. Gött. 1832), in the *Zeitschrift für Kunde des Morgenlandes*, in the *Abhandlungen* of the Gottingen Philosophical Society, and in the *Gottinger Gelehrten Anzeigen*, but especially in the *Jahrbücher der Biblischen Wissenschaft*, established by him (vols. i.-xii. Gött. 1849-65). E.'s latest works are *Das Sendschreiben an die Hebräer* (1871), and *Sieben Sendschreiben des Neuen Bundes* (1871). E. died at Gottingen, 5th May 1875.

Ewald, Johannes, the greatest lyric poet of Denmark, was born at Copenhagen, November 18, 1743. He lost his father at the age of eleven, and was educated at Slesvig school. His romantic adventurous spirit prompted him, when only sixteen, to join the Prussian army, which he afterwards quitted for the Austrian service. In 1760 he returned to Copenhagen and devoted himself to theology, but his studies were cut short by a disappointment in love. He was then aged twenty-two, and had given no proofs of a poetic gift; but a funeral ode which he wrote on the death of Frederic V. of Denmark in 1767, gave him a high literary standing. He became rapidly famous as a lyric and dramatic poet, but sank into dissipation and poverty, and was deserted by his mother and nearest relatives. Finally he received a government pension, and died at Copenhagen, March 17, 1781. In E.'s time a bitter feud was going on between the French and the German schools in Danish literature, and E., who was an ardent disciple of Klopstock, did much to introduce German ideas and tastes. E.'s lyrics are the finest in Danish poetry. His *Kong Christian stod ved höien Mast*, which is translated by Longfellow, has become the Danish national anthem, and many of his sea-songs are very popular. His works are carefully finished, sometimes bombastic, and sometimes bright with heroic exultation or fantastic humour. His dramas include *Adam og Eva*, *Lykkens Tempel*, *Balders Dod*, and *Fiskerne*—the two last being probably his masterpieces. The best edition of E.'s works is that by Liebenberg (Copenh. 1850-55). See the lives of E. by Molbech (1831), Hammerich (1851), and Olsen (1861).

Ewe, a female sheep, whose wool has been twice clipped, and which has proved itself fertile. *Ewe hogg*, a female lamb. The origin of *hogg* is thought to be the Celtic *og*, 'young,' whence *ogan*, 'a young man,' and *oigie*, 'a virgin.' *Eild gimmer*, a ewe hogg twice shorn, which has never been put to the ram. See Stephen's *Book of the Farm*.

Examina'tion of a Bankrupt. See BANKRUPTCY.

Examination of a Prisoner. For England, see ARREST. For Scotland, see DECLARATION, CRIMINAL PROCEDURE, PRECOGNITION.

Examination of a Witness. See EVIDENCE.

Examinations for the Public Service. Formerly the junior appointments in the Civil Service could only be obtained through patronage. There are now two ways of admission—(1) by private influence and nomination, with subsequent success in an examination; (2) by competition open to all candidates, without private influence, and limited only by certain regulations as to age, health, character, and nationality.

The first, or 'new system,' as it was then named, was adopted in 1855, in conformity with the recommendation of a Committee of Inquiry constituted two years previously. It was applied to all the public departments till June 1870, on the 4th of which month forty-four of the public offices and one department of the Post-Office were by an Order in Council opened to persons who without previous nomination or private influence should offer themselves as candidates, and be able to pass the appointed examinations.

The preliminary examination is in handwriting, orthography, and English composition. If a candidate fails in this, he will not be admitted to the next competitive examination, or to any preliminary examination within three months after his rejection. Having passed the preliminary examination, the first-class candidate must be prepared for examination in some of the subjects which are here given, with their maximum number of marks:—English composition, including *précis* writing, 500; history of England, including that of the laws and constitution, 500; English language and literature, 500; language, literature, and history of Greece, 750; of Rome, 750; of France, 375; of Germany, 375; of Italy, 375; mathematics, pure and mixed, 1250; natural science, that is, chemistry, including heat, electricity, and magnetism, geology and mineralogy, zoology, and botany, 1000 (the total being obtainable by adequate proficiency in any two or more of the five branches); moral science, that is, logic, mental and moral philosophy, 500; jurisprudence, 375; political economy, 375. The fee for this examination is £5. The second-class examination is held under the same conditions as the first class, the subjects being adapted to persons of inferior education, and the appointments consequent on passing being of course of smaller value and importance. The subjects and possible marks are—Handwriting, 400; orthography, 400; arithmetic, 400; copying MS. (to test accuracy), 200; indexing or docketing, 200; digesting returns into summaries, 200; English composition, 200; geography, 200; English history, 200; book-keeping, 200. The fee is £1.

The most important and lucrative branch of the Civil Service open to competition is that of India. The candidate must satisfy the Civil Service Commissioners before 1st February that he is a born subject of the Queen, that his age on the following 1st March will be above seventeen years and under twenty-one, that he has no bodily infirmity unfitting him for the Civil Service of India, and that he is of good moral character.

The subjects of the first examination, and the maximum of marks attainable are the same as in the first-class home Civil Service, given above, except that *précis* writing is not part of the English composition examination, and that for jurisprudence and political economy are substituted the Sanskrit and the Arabic language and literature, with a maximum of 500 marks each. The number of successful candidates corresponds with the number of vacancies to fill which the examination is held. We believe there are usually about thirty-five vacancies, and usually about ten times as many candidates. The successful candidates have two years of probation and special study. There are during the two years four periodical examinations, and after each of the first three has been passed, the candidate receives an allowance of £50, and after the last half year £150. The following are the subjects of study for the second examination, with the maximum number of marks attainable:—Sanskrit, 500; vernacular languages of India, each 500; the history and geography of India, 350; law, 1250; political economy, 350. Candidates are told by the commissioners that they are expected to devote their whole time to the acquisition of these special branches of knowledge. The final examination, which is a most searching one, extending over three weeks, decides the fate of the probationer. If he succeeds, he will find himself on the high road to fortune and position. The lowest salary that any writer receives on arrival in India is £300 a year. Promotion is rapid, the salaries rising by hundreds of pounds a year. The highest salaries are those of the judges of the Sudder Courts, £5000 a year. In a recent final examination the highest number of marks gained was 3090, the lowest by a successful candidate was 1585. The objection has been made to the competition system, as regards the Civil Service of India, that the men thereby obtained for it are generally deficient in social polish compared with those obtained under the nomination system. To obviate this objection

it has been proposed (1876)—but the plan has not so far been given effect to—that the candidates chosen after the preliminary examination should continue their studies at one or other of the great universities of England, or at Trinity College, Dublin; the principle on which it is proposed so to favour these universities, and to exclude the Scotch and others, being that those favoured take a moral supervision of their students, which the others do not. It has also been proposed to make some change in the ages of candidates for the Civil Service generally.

The Indian Civil Engineering College at Cooper's Hill, Surrey, was established in 1870, with a view to the education of civil engineers for this department. Admission is obtained by competitive examination, to which all British-born subjects between the ages of seventeen and twenty-one, on the 1st day of July, and of sound constitution and good character, are eligible. There are also competitive examinations in connection with valuable appointments in the Forest Service of India and in the colonies. Examinations of candidates for the civil service of India will be made in 1877 and 1878 under the present regulations as to age; but in 1878 there will probably be a second examination under a new system which limits the age to nineteen years; hence only a few candidates will be chosen at the first examination in 1878. See *Guide to Employment in the Civil Service*, with an introduction by J. D. Morell, LL.D.

Exam'ined Copy, in English law, is a copy or extract of a deed or entry in the record certified by the proper officer. The analogous term in Scotch law is Extract (q. v.).

Exanthem'ata (Gr. lit. 'blossoms,' 'what burst forth,' then 'eruptions,' from *exantheō*, 'I burst forth as a flower'), a class of febrile diseases, attended by eruptions on the skin, which appear at a definite period and run a definite course. The E., or eruptive fevers, belong to the miasmatic order of zymotic diseases, and are small-pox, chicken-pox or varicella, miliary fever, scarlet fever, hybrid of measles and scarlet fever, rubeola, dengue, erysipelas, and plague.

Ex'arch (Gr. *exarchos*, 'a leader'), a title which was at first given to the leader of the chorus in a Greek play, was afterwards conferred on bishops in the Greek Church, and is now applied to a deputy of the patriarch in the Russian Greek Church. Under the Byzantine empire the governor of a border province was called an E. When Narses, the general of Justinian, destroyed the Ostrogothic kingdom in Italy, he ruled that country as an *exarchate* of the Byzantine empire until his death in 567. The Bishop of Rome and the *duces* or rulers of the various Italian provinces soon made themselves independent] of the exarchate, which became confined to the districts round Ravenna, and remained subject to the Eastern empire until Aistulf, king of the Lombards, took Ravenna in 752. Another exarchate was founded in Africa in 534, and was abolished by the Arabs in 698.

Excam'bion is, in Scotch law, the name of the contract by which one piece of land is exchanged for another. The implied Warrandice (q. v.) of this contract is real warrandice, in virtue of which either party in the event of eviction from the land which he has received in E. may recover the land which he gave in exchange. The portions exchanged must not be more than one-fourth of the value of the estate, and they must not include the principal mansion, house, garden, park, or home farm. In English law, see EXCHANGE, DEED OF.

Ex'cellence, or **Ex'cellency**, a title first borne by the Lombardic, then by the Frankish kings, and by the German emperors till the 14th c. The Italian princes used it in the 15th c., but from the 17th exchanged it for *Altezza* ('highness,' Fr. *Altesse*). It has since become in most countries the designation of ambassadors; but in Italy the title *Eccelenza*, though properly belonging only to noblemen, is given by courtesy to every stranger to whom it is sought to show civility.

Exceptions, Bill of. In England, if the counsel for either party at the hearing or determining of a cause hold that the judge mistakes the law, he may require him publicly to seal a B. of E., stating the point in which he is supposed to err. This the judge is obliged to seal, or if he refuse, the party may have a compulsory writ against him. When jury-trial in civil causes was extended to Scotland, it having been deemed proper to adopt sundry English law terms and forms, amongst others Bills of E. were introduced, the form being prescribed in the Appendix to the Acts of Sederunt, 9th December and 3d July 1823.

Exchange', the name given in the great commercial cities of Britain to the institution where merchants, bankers, and stock-brokers meet for the transaction of business, or to obtain intelligence respecting the value of stock, &c. The institution, known as the *Bourse* (Lat. *bursa*, 'purse') in France and Belgium, the *Börse* in Hamburg and other German cities, the *Borsa* in Italy, is of foreign origin. Sir Thomas Gresham, who had long acted as British agent at Antwerp, resolved to reproduce the Bourse of that city in England. Gresham's Burse, as the new building was called, was commenced in 1566, finished in the following year, and inaugurated by Queen Elizabeth (January 23, 1570-71), under the title of 'The Royal E.' This building was destroyed by the great fire of 1666. It was replaced by a new E. in 1669, which was also destroyed by fire in 1838. The present London E. was built in 1842-45, at the cost of £150,000, and inaugurated by Queen Victoria on the first day of the latter year as 'The Royal E.' The business carried on 'on 'Change' consists of buying and selling merchandise, and paying, receiving, and exchanging money. After that of London may be mentioned, in Great Britain, those of Birmingham and Glasgow. The Bourse of Paris, that of Berlin, and the E. of New York are remarkable for their elegant architecture.

Exchange, in political economy, means the conversion of the money of one country into the money of another. *Rate of E.* means the price at which the conversion can be effected. This rate fluctuates according to the Balance of Trade (q. v.), it being in favour of that country owing least to the other. Thus, if England owes twenty millions of pounds to the United States, while the latter country owes England thirty millions, E. will be in favour of England; that is to say, if a resident in the United States wishes to convert a certain weight of gold or silver in American coin into British coin, he will receive less weight in British coin; while the resident in London who converts British into American coin will receive more weight than he gives. When E. is weight for weight, then it is said to be *at par*. Between England and France *par* is 25·2 francs per £1. If A of London owes B of Paris £100, and B owes C of London £100, the whole may be adjusted without transmission of bullion by A paying C £100. But if Paris owes London five millions of pounds, while London owes Paris only four millions, it is plain that the whole relative debt cannot be extinguished in this convenient way, and there must be the trouble and expense of transmitting bullion. The fact that Paris owes more to London than London to Paris causes a greater competition among Parisians for orders payable in London than there is in London for orders payable in Paris; E. will therefore be against Paris.

Exchange, Bill of. See BILL OF EXCHANGE.

Exchange, Deed of, in English law, is a deed by which one owner of land exchanges land with another. The portions exchanged must be of equal value, and the legal tenure must be equal. Thus estates held in fee-simple cannot be exchanged for estates held in fee-tail. (See FEE-SIMPLE.) By 4 and 5 Will. IV. c. 30, the proprietor of any land in *common field* may exchange it for any other land, whether lying in the same or in another common field, or for any enclosed land lying in the same or in an adjoining parish. For the exchange of land held in right of the Church, the consent of the patron and of the bishop is necessary.

Exchange, Military. By the Act 5 and 6 Edw. VI. c. 16, it was declared that all sales, or bargains for money or reward, of or about offices in the administration of justice or in the civil service, &c., should be void, and the intending seller should lose all right to the office, and the intending buyer should be disabled for ever from acquiring. By the Act 49 Geo. III. c. 126, this Act was extended to all offices in the gift of the crown, and was also extended to Scotland and Ireland. There were, however, excepted from this Act all *purchases* or *exchanges* of commissions in the royal forces at prices fixed by his Majesty's regulations. Any one giving or taking more than the regulation price was to forfeit his commission and to be cashiered. These Acts are known as the Army Brokerage Acts. In 1683 a royal warrant ordered the payment of one shilling in the pound on the surrender of a commission to the person surrendering. William III. forbade all payments, and exacted an oath from all officers that they had given no money. This rule was omitted from the Mutiny Act of 1701; and gradually purchase, recognised by the Court of Chancery, grew up into a

system. The subject was often dealt with by committees, but it was impossible to make overpayments cease, because the permission to buy led to the practice of bargaining. Hence in 1871, when Mr Gladstone's government failed to carry their bill abolishing purchase, they abolished it by royal warrant, dated 20th July 1871. The method of abolition is by cancelling all royal regulation of the prices at which purchases or exchanges were alone lawful. The regulations now require, as regards first appointments, a certain standard of examination; as regards promotion, a certain term of satisfactory service, and in most cases further examination. It was provided that officers of equal substantive rank on full pay exchange from one regiment or corps to another with the sanction of the commander-in-chief, and on a certificate from their superior officer that the E. does not originate in any cause affecting the character or efficiency of the parties, and on a medical certificate of fitness to serve, no officer being permitted to retire within six months of his E. It is explained that the warrant does not intend to interpose any obstacle in the way of exchanges between officers on full pay which are made to suit the reasonable convenience of officers. By the Act 38 Vict. c. 16 (1875), it is provided that her Majesty may authorise exchanges from one regiment or corps to another, *on such conditions as may seem expedient for the time*, and that notwithstanding the Army Brokerage Acts.

Exchange, Stock. In former times the business now carried on in the S. E. of London was transacted in the Bank of England; but about the year 1700 the dealers in public securities changed their place of meeting to what is now called *Change Alley*. In 1773 some of the brokers hired rooms for business purposes in Sweeting Alley. To these they gave the name of *S. E.* Subscriptions were subsequently raised to erect a building for the special purpose of dealing in stocks. The site chosen was Capel Court, so called after William Capel, Lord Mayor of London, who had resided there. Admission to the society of the brokers, which had formerly been free, was now appointed to be by ballot and subscription. The old building was removed and the present one opened in 1854. Members are governed by a committee, who have power to suspend or expel any member 'guilty of dishonourable or disgraceful conduct.' A member is not allowed to transact business with any one who is not a member, and all transactions must be according to the custom of 'the house.' 'Settling days' are, for consols, once a month, on a day between the 6th and the 11th; 'for other English and foreign stocks twice a month, about the middle and the end. Members of the E. are either 'jobbers' or 'brokers.' A jobber deals on his own account. A broker acts for a client, deals with the jobber, and is paid by commission. A 'bull' buys for settlement at a future date on the speculation of a rise in price in the interval. A 'bear' sells for future settlement, on the speculation of a fall in price in the interval. Hence what are called *bull* transactions and *bear* transactions are speculations for the 'rise' or 'fall' of stocks. 'Contango' is a payment for postponing settlement of a bull transaction from the original settling day to the next. It is the interest on the purchase-money for the time between the settling days. It is paid either to the seller of the stock, who agrees to wait a fortnight for his money, or it is paid to some one who lends the money to the bull. It thus often happens that the bear gets contango on the purchase-money on stock which he has not. If money is dear and stock plentiful, the contango rate is high. When conditions are reversed, as they often are from bear transactions, then the bear, instead of receiving contango from the bull, has to pay for not being required to deliver the stock sold. This payment is called a 'backwardation.' What is called the 'making-up' price of stocks is their average prices during the day, and the difference between this and the prices at which business is actually done is received and paid by the bulls and bears, or accounts are carried over on this principle. Such is the nature of what are called *time bargains*. Time bargains in bank shares were rendered illegal by a recent Act of Parliament, but its provisions have proved inadequate to produce the desired effect. The Pullinger frauds led to a rule being made that subordinates should not be dealt with without due notice to employers, but the rule, we believe, is little heeded.

Scrip—an abbreviation of subscription—is the document which certifies payment of deposits and calls on shares previous to the issue of the final certificate. It is negotiable.

Excheq'uer Bills are bills of credit issued (generally by authority of Act of Parliament) by Exchequer, and pledging the Government to repay the sum advanced with usual interest, generally 1½ to 2½ *per diem* per £100. Those issued by statutory authority are charged on the Consolidated Fund. By such bills the bank advances to Government are made. E. B. and Exchequer Bonds constitute the bulk of the unfunded debt. Public notice is given from time to time for repayment. Bankers prefer this security, because its value does not fluctuate. The Court of Chancery uses them for permanent investment, but private trustees should not do so except for temporary purposes. The chief modern statute is 29 and 30 Vict. c. 25.

Exchequer Bonds differ in being issued at fixed rates of interest for considerable terms of years.

Exchequer, Chancellor of, was at first the head of the clerks of the royal chapel, after they were formed, in the reign of Henry III., into a court which had both judicial and financial functions, and which as a financial body was called the *Court of the Exchequer*. It became solely judicial, but the C. of E. remained a financial minister, and is now the first minister of finance in the British Government. The Prime Minister, if he be a member of the Commons, can hold the office.

Exchequer, Court of. See COMMON LAW, COURTS OF; COURT OF JUDICATURE, SUPREME, ACTS.

Exchequer, Court of, in Scotland. The Scotch C. of E. prior to the Union was the King's Revenue Court, and consisted of the treasurer, the treasurer-depute, and as many lords of Exchequer as the king chose to appoint. By the Treaty of Union the court was continued until Parliament should constitute a new one, which was done by 6 Anne, c. 26. The constitution then given was maintained till the passing of the 19 and 20 Vict. c. 56, which transferred the jurisdiction of the E. C. of Scotland to the Court of Session.

Excip'ients (from Lat. *excipio*, 'I take out' or 'receive,' *i.e.*, along with something else), in materia medica, are inert or slightly active substances used as a medium of administration for active medicines, such as rose-water, mucilage, and syrups.

Excise' Laws. The taxes levied upon articles of consumption produced within the kingdom are called Excise Duties. They were first resorted to as a temporary expedient by the Long Parliament. They have ever since continued to be an important source of the imperial revenue of Great Britain. In 1733 Sir Robert Walpole introduced a bill for extending the operation of the excise, while at the same time it diminished its pressure by the Bonding or Warehousing System (q. v.), under which the taxed commodity may be locked in a Government warehouse and removed in instalments, a proportional part of the duty being paid at each removal. The scheme was, however, then defeated. It was not brought forward again till 1802, when it became law. The collection and management of the excise are under the Commissioners of Inland Revenue, who appoint collectors, accountants, and other subordinate officers. The levying of the revenue is facilitated in England and Wales by the division of the counties into fifty-six districts of collection, with a subdivision of each district, each subdivision having a supervisor with a gauger or surveying officer. The excise duties are increased by the duties on licences. Those within the limits of the chief office in London are granted by the Commissioners of Inland Revenue, or by persons employed by them for the purpose. Within the limits of the cities of Edinburgh and Dublin licences are granted by the commissioners or assistant-commissioners there, elsewhere by the collectors and supervisors of the respective excise collections. Upon death or removal, a licence may be transferred by endorsement for the residue of the term, but a fresh entry must be made of the premises. The penalties attached to the sale of excisable commodities without a licence are heavy, in some cases amounting to £500. The total revenue derived from excise was in 1872 £23,326,000.

Ex'citants. See STIMULANTS.

Excommunica'tion is the banishment of a member from the privileges of a religious community on account of impiety or other conduct inconsistent with the rules of the society. The first express mention of it among the Jews is in Ezra x. 7, 8, and Neh. xiii. 3. In later Rabbinical writings three degrees of E. are

distinguished:—(1) *Nidui*, involving certain privations in civil and religious matters for thirty days. This was probably the 'casting out of the synagogue' mentioned Luke vi. 22, John ix. 22 and xvi. 2. (2) *Cherem*, a more severe exclusion, prohibiting the offender from buying and selling, and including a curse or *anathema* (in the LXX. the Greek equivalent for Hebrew *cherem*, 'devoted,' *i.e.*, to destruction; in the New Testament rendered 'accursed,' *e.g.*, Rom. ix. 3, 1 Cor. xii. 3, Gal. i. 8, 9), that is, a sentence signifying danger of death. (3) *Shammatha*, by which an offender was given over totally and finally to the divine judgment. This is supposed to be the same curse as that pronounced by St Paul, 1 Cor. xvi. 22,—*Anathema Maranatha.* The latter word is the Hebrew form of the Aramaic for 'the (or 'our') Lord will come,' and was part of a cursing formula from the Book of Enoch—*cf.* Jude 14-16, and 2 Thess. i. 7-10.

E. was adopted in the Christian Church as a part of her discipline for preserving the unity and purity of her members, and consisted in excluding from the common benefits and privileges consequent on baptism until signs of repentance were shown. There were two degrees of the infliction, according to the heinousness of the offence committed:—(1) By the Lesser E. (called 'separation' or 'suspension'), inflicted for such offences as being absent from church on three successive Sundays, ante-nuptial fornication, marrying a third time, &c., offenders were excluded from the Eucharist, the prayers of the faithful, and from offering oblations. (2) The Greater E., inflicted for the greater sins of fraud, apostasy, blasphemy, fornication, adultery, murder, and idolatry, was total expulsion from the Church with an anathema or curse, and deprived the offender of Christian burial. At first the power claimed by the Church in this matter was entirely spiritual. While she excluded offenders from spiritual privileges, she left all their civil or natural rights unaffected, and so it always remained to a great extent except in Europe. Mosheim ascribes the greater severity of the sentence of E. which came into vogue in Europe to the influence of paganism. Those excommunicated by the Druidical priests, for example, were counted criminals, were shunned as if infected by the plague, and deprived even of the protection of the laws (Cæsar, *De Bell. Gall.*, vi. 13). So from the 8th c. onward in Europe a person excluded from the Church by a bishop, and especially by the Pope, was no longer regarded as a king or a lord, nor as a citizen, a husband, a father, or even as a man, but was considered a beast. Three gradations of guilt, in those liable to ecclesiastical censure, were established by the Council of Pavia (850). The first included those who willingly confessed their sins and submitted to the penance imposed; the second, those who for greater sins were excommunicated, but who submitted to the penance imposed, and were then restored to communion; the third, those who refused to submit to the penance imposed, and were in consequence anathematised, a sentence which excluded them not only from the Church, but from the society of Christians; in other words, they were outlawed. The sentence of E. was inflicted on a king for the first time by Pope Gregory V.—on Robert of France, 889. But Pope Gregory VII. was the first to carry out the full severity of the sentence described above—in the case of Heinrich IV., Emperor of Germany. The practice of laying whole nations under sentence of E. or an 'interdict' dates from the time of the same pope, or, according to others, of Alexander III., about 1160. The most illustrious princes of the middle ages were obliged to succumb to the effects of an interdict, but some time before the Reformation the terror of such a sentence was in great measure dissipated. From that time the effect of E. has been again, practically at least, entirely confined to spiritual matters.

Excoria'tion (Lat. *ex* and *corium*, 'the skin'), a part of the skin from which the cuticle has been removed by friction, heat, or the action of some acrid substance. Excoriations are common among infants, and may be cured by dusting flour, starch, or puff-powder, or oxide of zinc over the parts.

Excre'tion (from Lat. *excerno*, 'I separate'). This is the process by which refuse materials are thrown out of the body. These materials come from two sources—(1) The matters in food which are incapable of digestion or of assimilation, and which are ejected from the alimentary canal; and (2) matters formed by the disintegration of the tissues in consequence of their vital activity. Both of these kinds of materials, being not only useless but injurious, are thrown out of the body by various organs and channels. The channels of E. are—(1) *The lungs*, which separate watery vapour, carbonic acid, and a small amount of refuse organic matters which give frequently a taint to the breath. (2) *The liver*, which separates water, holding in solution, in the form of bile, various hydrocarbons, such as taurocholic and glycocholic acids, cholesterine, colouring matters, leucin, tyrosin, and other matters obtained from the disintegration of the tissues, and various salts, such as sulphates, phosphates, and chlorides of the alkalies and alkaline earths, and as a separate product, glycogen or animal starch. (3) *The kidney*, which separates nitrogenous matters, such as urea, uric acid, creatine, creatinine, &c., colouring matters, salts of various kinds, namely, the sulphates of soda, potash, and lime, the phosphates of soda, magnesia, and ammonia, and the chlorides of sodium and potassium. (4) *The skin*, which separates oily matter from the sebaceous glands, and sweat from the sweat glands, consisting of water holding in solution a small quantity of the salts of soda, potash, and lime, and occasionally urea, uric acid, grape sugar, albumin, and biliary colouring matters. (5) *The intestinal canal*, which discharges the fæces consisting of the refuse material of food along with a small amount of the constituents of the bile, mucus, fatty matter, and peculiar animal substances which give odour to the evacuations.

Exculpa'tion, Letters of, are, in Scotch law, a warrant granted at the suit of the panel or defender in a criminal prosecution, for citing and compelling the attendance of witnesses in proof either of his defence against the libel or of the validity of an objection against any juryman or witness. These letters are issued on application at the Justiciary Office, or in the case of sheriff-court libels, on application to the clerk of court.

Exe (Cymric, *wysk*; hence Lat. *isca*; comp. Gael. *uisg*), an English river, rises in Exmoor, Somersetshire, and 19 miles from its source reaches Devonshire. After a further course of 35 miles in a southerly direction through Devonshire it falls into the English Channel at Exmouth Bar. The tideway is 5 miles long and 1 mile broad at high water, and by means of this and of a canal, formed in the reign of Henry VIII., but considerably lengthened since, vessels can get up to Exeter. See AXE and ESK.

Ex'ecuted and **Exec'utory,** in English law, are terms expressive of the different stages of a contract. Matter is *executory* regarding which there is a contract binding the possessor to transfer it to some one else. When the property is transferred, it is executed. Thus an executory estate is one created by deed or fine (see FINE OF LANDS), but which must afterwards be *executed* by entry, &c.

Execu'tion, Civil (English law). If the judgment is not appealed against, suspended, or reversed, E.—that is, the enforcing of the sentence of the law—follows. E. is of different kinds. If the plaintiff obtain a verdict awarding real estate to him, a writ is directed to the sheriff commanding him to give actual possession to the plaintiff, and the sheriff may break open doors if possession is not peaceably yielded; but if the property is quietly given up, symbolical delivery is sufficient. Executions in actions where money only is recovered may be entered against the goods and chattels of the defendant. Every writ of E. must be sued out within a year and a day after the judgment is entered, otherwise the court concludes that the judgment is satisfied and extinct.

Execution, Civil (Scotch law), is an attestation by a Messenger-at-Arms (q. v.), or other officer of the law, that he has given the citation or executed the diligence in terms of his warrant for so doing. It corresponds to an affidavit of service of writ or summons in England. Two witnesses were formerly required in Scotland to executions, but one is now sufficient, except in cases of poinding, in which two are still required.

Execution, Criminal. See CAPITAL PUNISHMENT.

Execution, Military and Naval. See CAPITAL PUNISHMENT.

Execu'tioner, the person who carries into execution the last demand of the law by arranging and controlling the machinery for inflicting Capital Punishment (q. v.). Nominally this duty in the United Kingdom falls to be performed by the sheriff or by the youngest member of a burgh magistracy, but a deputy

has always been employed. In England and in some other states the office was at one time hereditary, and it was only in 1861 that the last headsman of the Tower of London died. But if the lineage of the E. be subject to vicissitude, his name is generally long-lived, for a distinguished practitioner has in many instances handed it down to several successors. Frenchmen have for many generations spoken of the functionary who superintends executions in the capital as 'Monsieur de Paris;' while in England, Dryden (see *Epilogue to the Duke of Guise*) and popular habit have immortalised the name of Jack Ketch. In the reign of James I. the London E. was named Gregory Brandon, and long after his demise the name Gregory was the household word for the hangman. Brandon was an esquire in virtue of his office, having had the influence to obtain armorial bearings from the College of Heralds. With 'Squire Dun,' mentioned by the poet Butler, the gentry of the gallows became extinct; for we find that Jack Ketch, whose name has ever since been synonymous with hangman, was the next E. The very obvious moral to be derived from practising hanging as a profession does not always appear to have been perceived by its professors, for we find that on the 31st May 1718, John Price, the London E., was himself executed for murder. Again, on May 24, 1736, returning from Tyburn, where he had suspended five thieves, the London E., stubbornly sinning against the light, picked a woman's pocket of 3s. 6d.; and as that was about the amount for the theft of which, in those days, persons were condemned to death, there is ground for the hope that this E. in his own person illustrated the law which he had himself done so much to uphold. It is questionable whether in Scotland the business was followed by persons any more respectable, for in 1682 the Edinburgh hangman, Alexander Cockburn, was himself hanged for murder. Of Scottish executioners, John Dalgliesh is almost historical as the functionary who executed Wilson the smuggler in 1736, on which occasion Captain Porteous ordered his men to fire upon the crowd, an act which led to remarkable consequences. In 1784 John High or Heigh, convicted of stealing poultry, was offered the alternative of undergoing due punishment for his crime or accepting the post of Edinburgh E., and chose the latter. This official survived to 1817, and was succeeded by John Scot, who was assaulted and killed in 1847. The mitigations which have taken place in the criminal code within recent years, by limiting the class of offences for which the punishment of death is inflicted, have produced great changes with respect to the E. In London executions have recently been performed by William Calcraft, who has, however, for some time been rendered unfit by age to perform his office, and has consequently been superseded. By the London E. all executions are performed in Scotland, and as a rule in the provinces of England, although in more than one district of England a local functionary is available. Sanson, the E. of Louis XVI., was the official employed in Paris on similar occasions for many years, and was succeeded by his son (see *Memoirs of the Sanson Family*, 1875). In the United States the sentence of death is carried out by the sheriff, assisted by the under-jailer.

Execution of Deed. In England the formalities required to make a deed valid against the granter are *signing*, *sealing*, and *delivering*. (See DELIVERY OF A DEED.) These again require to be verified by Attestation (q. v.). Delivery to the grantee renders a deed absolute. The E. of wills in England is by the testator signing in presence of two witnesses.

In Scotland E. of D. is by the granter signing or owning his signature before two witnesses, who sign their names, writing after them the word *witness*. E. is verified by what is called the Testing Clause (q. v.).

Exec'utive. See GOVERNMENT.

Exec'utor, in England, is the person to whom a testator commits the execution of his last will and testament. If the testator make a will without naming executors, or if he name incapable persons, or if the executors named refuse to act, the ordinary may appoint an administrator, whose duties are nearly the same as those of an E. The personal property of one deceased vests from the time of his death in his E. When a person dies intestate, the Court of Probate will grant administration to the next of kin. An E. may be appointed by words which are indirect. No one is bound to accept the office; but if he do any act of administration, he will be held to have accepted, and he cannot then renounce without sufficient cause. It is the duty of an E. or administrator to apply for probate of the will or for letters of administration. Neither will be granted until the probate duty has been paid on the full value of the deceased's personal property, including leasehold. After obtaining probate, an inventory must be made of the whole of the deceased's goods and chattels, which if required must be delivered on oath in presence of two credible witnesses. So delivered, no creditor can afterwards object to it. An E. must be careful as to the order in which he pays debts, as should he pay one kind of debt before another kind to which it is legally postponed, he will be personally liable in the event of a deficiency of assets.

In Scotland the office of E. is conferred either by the written nomination of the deceased, or, failing that, by decree of the Commissary (q. v.); the E. in the former case being called an E.-nominate, and in the latter an E.-dative. In either case the E. must complete his title to administer by a judicial proceeding called a confirmation, without which he has no title to sue; nor is it safe for a debtor of the deceased to pay him. An E. should pay no debt of the deceased without the authority of a decree; and even when a decree is produced, he should pay no debt within six months after the death of the deceased, except what are called Privileged Debts (q. v.).

Executors, or heirs *in mobilibus*, are in Scotland the whole next of kin of one deceased, that is, all the nearest in degree of blood. They succeed *ab intestato* to equal portions of the movable estate, without regard to primogeniture or sex. But when one of the next of kin is heir to the heritage, he is not entitled to share in the movable succession, unless he choose to collate. (See COLLATION.) Formerly there was no right of representation regarding succession to movable estate in Scotland. Thus children of one deceased excluded the grandchildren. But this has been changed by 18 and 19 Vict. c. 23. In collateral succession full brothers and sisters exclude half; and if there be no descendants of an intestate, a father is entitled to one-half, the remainder being equally divided between brothers and sisters. If the father be dead, the mother takes one-third; and if there be no other surviving relatives, the other two-thirds go to the crown.

Exec'utory Devise', in English law, is the term which denotes the devise of an interest which does not vest on the death of the testator, but the vesting of which is deferred or contingent. The law on this subject underwent much learned discussion regarding the will of Mr Thellusson, an eminent London merchant. He died leaving three sons to whom he left small legacies. The rest of his property, £4500 a year of real estate and £600,000 of personal property, he devised to trustees, to be accumulated during the lives of his three sons and of their sons. On the death of his last surviving grandson the accumulated fund was to be divided into three shares, one share to go to the eldest male lineal descendant of each of his three sons, with provision in case of failure. When Thellusson died, he had three sons and four grandsons, two being born afterwards. Had the intention of the testator been carried out without litigation, it has been calculated that the fund would, when it came to be divided, have been over thirty-two millions of pounds. But the result was protracted and enormously expensive litigation. The judges in the House of Lords ultimately unanimously resolved that the will was legal. But to prevent repetition of the eccentricity, the Act 39 and 40 Geo. III. c. 98 was passed—which does not apply to Ireland—prohibiting any settlement of property for accumulation for more than twenty-one years after the death of the testator, or beyond the coming of age of any one entitled to the profits under the settlement.

Exege'sis (Gr. from *exēgeomai*, 'I lead the way,' 'set forth,' 'explain;' used of diviners and priests) is the art or science of interpretation, or of discovering the true meaning intended to be conveyed by a writer, and is generally, although not necessarily, understood to refer to the Holy Scriptures, in which sense it is treated in the present article. The relation of E. to Hermeneutics is that of practice to theory. The task the exegete or interpreter has to perform is to explain the sense of what is written, so that others, as far as possible, may think the same that the writer or speaker intended they should think. And since, in order properly to accomplish this task, he must first understand what he is to explain, he must first overcome all

the difficulties that lie in the way of his doing so—difficulties arising from (1) the language in which the books are written; (2) the subjects of which they treat; and (3) his own preconceived notions and prejudices. 1. For the first there is required a thorough knowledge of the languages used—Hebrew and Greek—in their words, idioms, and figures: *grammatical* interpretation. 2. For the second, a knowledge of various subjects and sciences—*e.g.*, history, geography, chronology, antiquities, astronomy, geology, &c.—in order to place what is written in the light of the age from which it is descended, as thus only can the writer's meaning be known: *historical* interpretation. 3. The interpreter must consider the passage in connection with the writer's general way of thinking and of viewing matters, in order to illustrate thereby what has been ascertained by grammatical and historical means: this has been called *dogmatical* interpretation. Such are the true principles of E., but various other methods have been followed, which may be briefly noticed. Perhaps the most remarkable, as it is the earliest, is the allegorical. Allegorical E. is the system of explaining as allegorical what is not allegory, of giving to words a secondary, mediate, and mystical sense in addition to their primary, direct, and literal sense, retaining the latter merely as a veil to the former. Allegorical interpretation was very common among all the nations of the East. For example, when the Greeks began to feel that the mythical stories about their deities were too gross to be understood literally, their philosophers ingeniously discovered in the descriptions of the poets 'ideas less revolting to virtue and more worthy of the gods themselves.' The custom existed also among the Jews, especially those residing in Egypt. The *Therapeutæ* rejected the literal sense of Scripture altogether. Philo, who expounded the Pentateuch in the light of the Neo-Platonic philosophy, did not deny the reality of the literal sense, but represented Moses as having an exoteric doctrine for the illiterate and an esoteric for the cultivated, who are able to reach the secret spiritual sense of his writings. Among the Jews of Palestine also the same desire appeared to remove in the same way everything objectionable in the Bible. In the oldest Rabbinical writings the same distinction is made between the *body* and the *soul* of the text. The same method was pursued by almost all the Christian fathers down to the 7th c. One of them, Justin Martyr, alludes to three of the four senses of Scripture mentioned by many of the succeeding fathers—namely, the *literal*, the *allegorical*, and the *tropological*; and of the fourth, the *anagogical*, according to which accounts of things in this life are applied to spiritual and heavenly things, many examples occur in his writings. The principles of E. followed by the Alexandrian school of divines, at the head of whom stands Clement, was connected with their theology. They made a distinction between *pistis*, an immediate reception of the truth without proof, and *gnōsis*, a complete view of the truth, by means of which the object of faith becomes a firm and sure possession. By this distinction, and the separation of Christians into *pistoi* (believing) and *gnōstikoi* (discerning), the latter came to be regarded as possessed of a divine qualification, by virtue of which alone all revelation could be expounded. Further, it is the allegorical sense of Scripture which leads to the *gnōsis*, while the *pistis* alone is produced by, and can understand only, the literal sense. Clement also makes mention of 'a rule of truth,' that is, a tradition or principle of E. About the beginning of the 6th c., a practice took its rise of making extracts from the commentaries of preceding fathers. When the annotations of several writers upon one book of Scripture were collected and arranged in succession, it was called a *chain*, Lat. *catena*. The custom soon became general with the decline of sacred literature; the very practice itself, which took for granted that everything connected with the interpretation of the Bible was anticipated and exhausted, being a sign of degeneracy; and a great many of the subsequent commentators were merely compilers of catenæ. A new era in the history of E. was initiated by the paraphrases and annotations on books of the New Testament of Erasmus, whose E. was to a great extent the guide of the Reformers, and whose 'great object was to ascertain what the words of Scripture were designed to express, without pursuing the far-fetched senses among which the schoolmen and mystics loved to lose themselves.' Since the Reformation E. has not run into the same excesses as before, but nevertheless various arbitrary and unwarrantable systems have been followed. (1) The Mystic, a modification of the old allegorical system, which has always found favour among a certain class of Protestants as well as Roman Catholics. According to this system, of which there have been various phases, a mystic, spiritual, mediate, or sub-sense is sought for when the literal is thought not to be subservient to morality. (2) The Pietistic, in which the regulating principle is an inward light, somewhat analogous to the ancient *gnōsis*, which guides to a true faith and a pure morality. This inspiration furnishes explanations without scientific investigation; hence the feelings rather than the understanding are consulted and followed. (3) The Moral, a mode of E. which was advocated by Kant, and which consists 'in educing from Scripture such ideas alone as are conformable to the pure principles of practical morality implanted in the bosoms of men.' 'The historical part of the Scriptures, which contributes nothing to make men better, is purely indifferent.' (4) The Historico-Psychological, chiefly developed by Paulus and Eichhorn, according to which everything—in the Gospel narratives, *e.g.*—is explained quite naturally, that is, all the miracles, when disentangled from the misconceptions of the narrators, and divested of all subsequent accretions, are explained as actual facts within the limits of the general laws of nature. (5) According to the Accommodation theory, usually associated with Semler, Jesus and the apostles accommodated themselves to the erroneous opinions of the Jews so far as was thought necessary or useful for the reception of the doctrines inculcated. (6) According to the Mythical system, which was followed by Strauss in his *Leben Jesu*, portions of the historical accounts of the Evangelists, especially those containing miracles, are to be regarded as mere myths, although the Evangelists themselves intended to relate history. (7) In the Rationalistic system, an external standard is set up to which Scripture must bend. It proceeds on the assumption that the sacred books should be subjected to the same treatment as, *e.g.*, the Greek and Roman classics, and that what is contradictory to reason is to be discarded. See Davidson's *Sacred Hermeneutics* (Edinb. 1843); Dœdes's *Manual of Hermeneutics* (from the Dutch, Edinb. 1867); J. Jahn's *Enchiridion Herm.* (Vienna, 1812); H. N. Clausen's *Herm. des Neu. Test. aus dem Dan. übers.* (Leips. 1841); T. H. Horne's *Introd. to the Crit. Study and Knowl. of the H. S.* (11th ed. 1856).

Ex'elmans, Remy-Joseph-Isidore, Comte, Marshal and Peer of France, born at Bar-sur-Ornain (Meuse), 13th November 1775, entered the French army in his sixteenth year, distinguished himself at the capture of Naples (1799), and served as adjutant to Murat in 1805. After Eylau he was appointed brigadier-general; in 1808 he co-operated with Murat in Spain, where he was taken prisoner, and sent to England. Regaining his freedom after three years' captivity, he rejoined the French army. He fought with distinction throughout the Russian campaign, was appointed general of division, and received the decoration of the Legion of Honour in 1813. Proscribed after the fall of Napoleon, he lived in exile until the July revolution of 1830, after which Louis Philippe named him Grand Cross of the Legion of Honour and Peer of France. He was one of the first adherents of Louis Napoleon, who created him Marshal of France in 1851. E. died on the 21st July 1852, from the effects of a fall from his horse.

Exemplifica'tion of Letters Patent is a copy or transcript of the letters patent made from the enrolment, and sealed with the Great Seal of England. In legal force the E. is equivalent to the letters.

Ex'ercise, Physiolog'ical Ac'tion of. E., either mental or muscular, if not pushed beyond a certain limit, cannot fail in being beneficial to the economy of the body. Moderate E. increases the nutrition of both the muscular and nervous systems, and so makes them stronger and more fit for a certain amount of work. The effect of such E. is seen in the well-developed muscles of the artisan, or in the quickness of perception and of volition in the active brain of the man accustomed to mental work. Moderate E. also increases the action of the heart. The muscular movements, for example, made in active walking drive, by pressure on the veins, more blood to the heart. This organ consequently beats faster, and sends more blood to the lungs and to the system than it would otherwise have done in a more lethargic state of the circulation. Hence, muscular activity improves the nutrition, and consequently the whole tone and power of work of the body. The effect of excessive E. is to produce fatigue and a feeling of great nervous depression.

Exe'ter (Old Eng. *Exanceastre*, 'the town on the Exe' (q.v.); the Roman *Isca*, and the *Caer-Isc* of the Britons), a city of England, capital of Devonshire, lies picturesquely on a height overlooking the Exe, 9 miles from the sea, and 75 S.W. of Bristol by railway. It is in part well built, and has some fine squares and gardens. The see of a bishop, E. has a Norman-Gothic cathedral (1194–1327), with a length of 383 feet and 35,370 feet of area. Its W. façade is one of the finest in England, and it has a magnificent organ, a canopy over the bishop's chair, 53 feet high, the parts of which are dovetailed into each other, and a bell, the 'Great Tom of E.,' weighing 12,500 lbs. The cathedral was opened October 18, 1877, after a restoration which cost nearly £50,000. E. also has a bishop's palace, a guildhall of 1593, restored in 1864, an Albert Memorial Museum (1868), a theatre, &c. There is a dock 917 feet long, 90 to 110 feet broad, and 18 feet deep, connected by a navigable canal (5 miles in length) with the lower part of the Exe. In 1875 there entered the port of E. 611 British and foreign vessels, tonnage 51,836; cleared 316, tonnage 23,510. Pop. of city (1871), 34,650; of parliamentary borough, 44,226. It returns two members to Parliament. E. was in existence when the Romans conquered the island, and was called by them *Isca Damnoniorum*, and from that day to this it has been uninterruptedly occupied. Roman remains—coins, bronze statues, penates, tesselated pavements, &c.—have been found in the neighbourhood, and beneath the old walls. It was the scene of many a fierce siege by the English, Danes, and Cornish Britons. Æthelstan founded an abbey here in 932, and E. soon after had so many religious buildings that it was called 'Monk Town.' In the time of Harold it was held by his mother Gytha, and was stormed by William the Conqueror in 1068, who built a castle, called by its Norman occupiers *Rougemont* ('red mount'), which completely commanded the city. In the civil war of the 12th c. it was held for Maud by the Earl of Devon, and was besieged for two months by the troops of Stephen. In 1537, Henry VIII. made E. a county by itself. Queen Elizabeth conferred on it the title of *semper fidelis*. It was Royalist during the Puritan struggle, and was for a time the headquarters of Charles's forces in the W. of England. See Izacke's *Remarkable Antiquities of the City of E.* (Lond. 1724), Jenkins, *History and Description of the City of E.* (1806), and Freeman, *History of E. Cathedral* (1873).

Exeter College, Oxford, founded in 1314 by Walter de Stapledon, Bishop of Exeter, and sometime Lord High Treasurer of England, for a rector and twelve fellows. Eleven additional fellowships were added at various times. The 17 and 18 Vict. c. 81 reduced the fellowships to fifteen, open to all who have passed the B.A. examination, been incorporated as graduates of the university, or become members of Convocation. Twenty-two scholarships have been founded; ten open, ten limited to persons born or educated in the diocese of Exeter, and two to persons born in any of the Channel Islands. There are nine exhibitions in the gift of the college, and ten more attached to it. The college has the patronage of fifteen livings. The number of undergraduates in 1875 was 166.

Exhaus'tions, Method of, a geometrical method employed by the ancient mathematicians, which may be looked upon as anticipating the principles upon which the differential calculus is founded. It was the method by which Archimedes squared the parabola, and discovered his famous theorems of the sphere and cylinder; and it depended upon the assumption that a curved line may be regarded as the limit of the circumscribing and inscribing polygons, as the number of the sides is increased, and therefore the size of each side diminished.

Exhibi'tion, a term of Scotch law applied to an action for compelling production or delivery of writings. See DILIGENCE, HAVER, INCIDENT DILIGENCE.

Exhibitions, Art. See ART EXHIBITIONS.

Exhibitions, Indus'trial, are collections of industrial products and manufactures exhibited, generally for a limited period, by different manufacturers and producers, with the view of showing the nature of their calling or the perfection of their manufactures. Some are merely local, and confined to the peculiar products and manufactures of the district in which they are held. Others are devoted to special branches of industry, the 'exhibits' in which are not necessarily confined to any example. A third class is universal in its scope, and aims at nothing less than illustrating the natural products, processes of manufacture, and finished articles of the entire world. Indeed, the later E. of this third class have been even more ambitious still, and in addition to illustrating the industry of the world, they have attempted to bring together representations of the fine arts, archæology, social condition, habits, and religious practices of all mankind. The parent of all the I. E. of modern times was one projected by the Marquis d'Avèze, and opened in 1798 in the Maison d'Orsay. The second exhibition was held in 1801, under the patronage of Napoleon as First Consul. The number of exhibitors meantime had increased from 110 to 229. From this period onwards E. came to be of frequent occurrence in Paris and the French provinces, and they gradually extended to every state of Europe. It was not till 1828 that an industrial exhibition was attempted in London, but in that year an organisation selected from mechanics' institutes throughout the country, under the presidency of Dr Birkbeck, instituted an exhibition in London under the lengthy title of 'The National Repository for the Exhibition of Specimens of New and Improved Productions of the Artisans and Manufacturers of the United Kingdom, Royal Mews, Charing Cross.' At a later period the Society of Arts held annual E. of new inventions and manufactures in the Society's house, London. Of agricultural E., the most noteworthy are the great annual shows of the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland. See AGRICULTURAL SOCIETIES.

The era of great international E. began with the opening of Sir Joseph Paxton's palace of glass in Hyde Park, London, by her Majesty Queen Victoria, in May 1851. The conception of the gigantic idea, and much of the credit of its realisation, are due to the Prince Consort, who at a meeting of the Society of Arts in June 1849 propounded the scheme. The story of the many difficulties regarding plans for a suitable building, and the ultimate acceptance of Paxton's plan, founded on his experience of conservatory building as a practical gardener, has often been told. The building of glass and iron, at a cost of £193,168, enclosed 20 acres, and was 1851 feet in length. It accommodated the works of 13,937 exhibitors, of whom 6861 were British, 520 colonial, and 6556 foreign. The exhibition remained open five months and a half, during which time it was visited by 6,039,195 visitors, the admission fees amounting to £423,792. After all expenses were paid, a surplus of about £180,000 remained, which her Majesty's Commissioners invested in the purchase of an estate at South Kensington, on which subsequently the South Kensington Museum, the Royal Horticultural Society's Garden, the International Exhibition of 1862, the Albert Memorial Hall, and other institutions were placed. The Great Exhibition of 1851 was hailed by the public with extraordinary enthusiasm, and the most extravagant expectations of millennial peace, combined with increased trade, were widely entertained. That the comparisons which it permitted quickened industrial energy, and more particularly made British manufacturers realise their backwardness in taste and artistic design, cannot be doubted, but the other dreams to which it gave occasion were quickly dissipated. The success pecuniary and otherwise of the exhibition, however, gave birth to a numerous train of successors, among which we shall only enumerate those which were on even a greater scale and more cosmopolitan in character.

The *Exposition Universelle* of Paris in 1855 was held in the *Palais de l'Industrie*, a specially-erected permanent building, which, with its temporary annexes, cost half a million sterling. It accommodated 20,839 exhibitors, and while open from 15th May to 30th November was visited by 5,162,330 persons; the total receipts being £128,000, against an expenditure of about one million. In this and subsequent E. international collections of pictures formed a peculiar feature. The next great exhibition, in order of time, was the London International Exhibition of 1862. The building was of brick, the main hall being a parallelogram 1150 feet long by 560 wide, which with annexes cost £460,000. Remaining open from the 1st May till the 15th November, it was visited by 6,211,103 persons, and the total receipts were £408,530. A second *Exposition Universelle* was opened on the Champs de Mars in May 1867, the building for which was oviform, and the different sections were arranged in concentric bands. By the arrangement adopted, the entire collections of any nation could be examined by proceeding from the outer band to the

centre, and special classes of articles from all nations could be visited by making the circuit of the building in any continuous ring. Beyond the exhibition building, part of the park was enclosed for illustrations of national habitations; and the life, clothing, food, and domestic habits of various peoples were practically illustrated by living families brought from all corners of the globe to inhabit the houses of their countries. The *Exposition* was visited by 6,805,969 persons, and the receipts from all sources were £420,735. The *Weltausstellung* of Vienna, 1873, a building with a central rotunda 312 feet in diameter, covered by a dome, supported on iron girders, larger than that of St Peter's at Rome, was constructed by J. Scott Russell, and was visited by 6,740,500 persons during the six months it remained open, and the total receipts amounted to £206,477. The Centennial Exhibition of the United States, being held this year (1876) in Fairmount Park, Philadelphia, is the 'biggest thing' which has ever been drawn together. It comprises a main building 1880 feet long by 464 wide, covering 21¼ acres, a permanent art gallery, a machinery hall, an agricultural hall, and a horticultural hall, the whole extending over 40 acres. An exhibition on a still more gigantic scale is contemplated for 1878, to be held in Paris.

In proportion as these great shows have been repeated and grown in bulk, public enthusiasm for them has steadily waned. They are found to involve a large expenditure on the part of the States which organise them, which, however, is partly recouped by the traffic drawn towards the cities in which they are held. While they are regarded as a very good advertising medium by the enterprising merchants and manufacturers who exhibit in them, all faith in their mission to promote universal brotherhood is gone, and it is seriously doubted whether they do much towards a real extension of commercial relationship, or aid in the improvement of manufacturing processes.

Ex'itus, a term of Scotch law denoting the issues or profits of anything. *E. terræ* are the rents and fruits of the land.

Ex'moor For'est, a high wild tract of moorland, broken by deep romantic glens, in the W. of Somersetshire, and N. and N.E. of Devon. Its highest point is Dunkerry Beacon, Somersetshire (1668 feet). It is traversed by the rivers Exe and Barle. E. F. was formerly of greater extent, but is being brought under cultivation, and has several iron-mines. Red deer are to be seen, and E. is famous for its hardy ponies.

Ex'mouth, a watering-place in S. Devon, on the English Channel, and on a rising ground at the mouth of the Exe, 10 miles S.E. of Exeter, with which it is connected by rail. It has a mild climate, being sheltered from E. winds by a range of hills. Its chief industries are lace-making and the fisheries. A sea-wall, 18 feet high, affords an excellent promenade. Till the rise of Torquay it was the most noted watering-place in Devonshire. Pop. (1871) 5614.

Exmouth, Edward Pellew, Viscount, an English naval commander, was born at Dover, April 19, 1757. He entered the navy at thirteen, and had a career of uninterrupted success and honour. In 1793, when captain of the *Nymph*, he captured, after a fierce fight, a French frigate, *La Cleopatre*. For this he was knighted. During the wars with France he performed many brilliant exploits off the French coast. In 1804 he was appointed to the command of the English fleet in the E. Indies, and after 1808 held a similar post in the Mediterranean. In 1814 he was raised to the peerage, and two years later, at the head of an English and Dutch fleet, he bombarded Algiers, destroyed its fleet, and compelled the Dey to accept the terms imposed upon him, which included the total abolition of the slave trade. This was the crowning achievement of his career. He was made Viscount Exmouth, and publicly thanked for his services by both Houses of Parliament. E. died 23d January 1833. See Osler's *Life of Viscount E.* (Lond. 1854).

Exoce'tus. See FLYING-FISH.

Ex'odus, the second book of the Pentateuch and of the Bible, and so called from its narrating the departure (Gr. *exodos*) of the Hebrews from Egypt, consists of two parts, an historical and a legislative. It is a continuation of Genesis, and the first part relates how the descendants of Jacob were reduced to slavery by a successor of the Pharaoh the patron of Joseph, and grievously oppressed (i.), till at last Jehovah, their God, took pity upon them, and appointed his servant Moses, who had been providentially preserved in his infancy, and was at the time in the land of Midian, to deliver them (ii.–iv.); how Pharaoh, by means of miraculous plagues sent on the land by Jehovah, was compelled to let the Hebrews go, in commemoration of which deliverance the Passover was instituted (v.–xiii.); and how, pursuing after them (? he and) his host were drowned in the Red Sea, while the Hebrews, for whom a path through the sea had been miraculously opened, passed southwards along the shore till they arrived at the desert of Sinai (xiv.–xviii.). The second part of the book relates how Moses received from Jehovah on Mount Sinai the Decalogue (xix.–xx.), laws for the regulation of the social life of the people (xxi.–xxiii.), and instructions for the making and all the appointments of the Tabernacle, and for the keeping of the Sabbath (xxiv.–xxxi.); and how the Tabernacle was made and inaugurated in the first month of the second year after the departure from Egypt (xxxii.–xl.). This article will deal principally with the E. as an historical fact. The question of the *authorship* of the book is involved in that of the authorship of the Pentateuch; other details will be found under MOSES, PLAGUES OF EGYPT, PASSOVER, SABBATH, &c.

The Exodus.—1. *Time.*—The important questions connected with the chronology of the E. are—(1) how long did the oppression of the Hebrews by the Egyptians last, and (2) when did it cease. The light on the subject comes from two sources—the Hebrews themselves and the Egyptians. The narrative in E. implies that the oppression did not last long, for, beginning as soon as the generation of Joseph had passed away, and a king who knew him not sat upon the throne (in whose reign Moses was born), it ended with the E. in the reign of his successor (ii. 23). This is confirmed by the genealogy of Moses, given vi. 16–20. He was at the same time the grandson and the great-grandson of Levi, the son of Jacob, which corresponds with the statement in Genesis xv. 16, that they would return to Canaan in the fourth generation after their settlement in Egypt. On the other hand, it is stated elsewhere (Gen. xv. 13, and Exod. xii. 40) that the slavery lasted 400 years, and the whole sojourn in Egypt 430 years. But the Apostle Paul (Gal. iii. 17) dates the beginning of the 430 years, not from the time of the going down into Egypt, but from the giving of the promise to Abram (Gen. xv.), which, counting 25 years from Abram's leaving Haran to the birth of Isaac (Gen. xii. 4, xxi. 5), 60 to the birth of Jacob (Gen. xxv. 26), and 130 to the going down into Egypt—in all 215 years—leaves 215 for the sojourn in Egypt. This is in fact the only way that the time can be made nearly to correspond with the genealogy of Moses (Exod. vi. 16–20), because, if the sojourn in Egypt lasted 430 years, Moses, who was 80 years old at the E. (Acts vii. 23, 30), must have been born when his mother was 256 years old, even if we suppose her to have been begotten in the last year of her father's life; for her father, Levi, who lived 137 years (Exod. vi. 16), was 43 years old when he went down to Egypt with his father [being four years older than Joseph, because born in the third year after Jacob's marriage with Leah (Gen. xxix. 34), and Joseph in the seventh (Gen. xxx. 25, *cf.* xxxi. 41), and Joseph was 39 years old at the time (*cf.* Gen. xli. 46, and add nine years)], which gives 430 − (137 − 43 + 80). There would, moreover, be no necessity for putting St Paul, who followed the LXX., in the wrong, were it not for the numbers of the nation who are said to have gone out of Egypt—600,000 fighting men, which implies a population of at least 2,500,000. This increase from the 70 persons who went down to Egypt (Gen. xlvi. 27) in 215 years appears to some so improbable as to make them adopt the 430, or even a longer period, while to others the 215 seems quite sufficient, with allowances for polygamy and foreign marriages. According to the traditional Biblical chronology, then, the date of the E. would be about 1650 B.C. or 1865 B.C.

The Egyptian accounts are derived from inscriptions on monuments, and from the history of Manetho (q. v.). Manetho (*apud* Josephus) tells the following story:—King Amenophis desired the privilege, which had been granted to Horus, of seeing the gods. One of the priests told him there would be no difficulty about it if he would rid Egypt of all who were unclean or leprous. Whereupon the king assembled all the lepers, to the number of 80,000, and sent them to work in the quarries E. of the Nile. The priest, in terror for the consequences of what he had done, took his own life, but first sent to the king a prediction that these outcasts, with foreign help, would be masters of Egypt for

thirteen years, the revenge of the gods for the indignity offered to their servants, the priests among the lepers. Thereupon the king relieved them all from their bondage, and permitted them to remove to the town of Avaris, where Osarsiph, a priest of Heliopolis, who afterwards took the name of Moses, put himself at their head, gave them laws which violated all the customs of the Egyptians, and sending for the remnant of the Hyksos, who had been expelled, with their help conquered Egypt. After a rule of thirteen years they were driven out by the king's son, Sethos or Ramses, and pursued to the borders of Syria. The question here is to identify the King Amenophis and his son Sethos-Ramses with the historical rulers mentioned on the monuments. It is in the reign of Rameses II. (Miamun of the monuments, Gr. Sesostris), of the nineteenth dynasty, who ascended the throne about 1400, that there occur events recorded on the monuments which correspond with those recorded in E. This Pher-ao, who reigned sixty-six years, erected as a bulwark against the Asiatics a great wall on the E. side of Egypt, from Pelusium to Heliopolis, with a chain of forts, the two chief of which were Pa-khatem (Pithom) and Paramessu (or 'city of Rameses,' *cf.* Exod. i. ii.). In an official report of the king's reign, preserved on a papyrus which is in the museum of Leyden, a scribe reports to his superior that he has distributed the rations 'among the *Hebrews* (Apuru) who carry the stones to the great city of Rameses-Miamun.' Several other distinct references are made to the Hebrews in other papyri, and in the rock inscription of Hamamat. Rameses was succeeded about 1334 B.C. by his son Menephtah (the Amenophis of Manetho), who continued the construction of Paramessu, and the brick-makers were condemned to send in a certain number every day (*cf.* Exod. v. 8). It is generally supposed by Egyptologists that this is the Pher-ao in whose reign the E. took place, on which supposition, as he reigned about twenty years, the date would be about 1334–14.

2. *Route.*—The traditional route followed by the Hebrews in their march from Egypt is in a sense well known. Setting out from Rameses, supposed to have been about 40 miles N.W. of Suez, they went S. and E. a three days' journey, halting at Succoth and Etham, and encamped on the Red Sea, near the head of the Gulf of Suez, the only controversy being as to the place—a few miles up or down—at which the passage took place. Those who wish to avoid the miraculous, and to account for the crossing by natural causes, *e.g.*, an ebb-tide, &c., place it at the very head of the Gulf. A new theory has lately been put forth by Professor Brugsch-Bey, which he asserts corresponds far better with the geography of the time, namely, that the route taken was E. and then N. between Lake Serbonis and the Mediterranean Sea. He asserts that Rameses, from which they started, was Paramessu, afterwards called Zoan, and still later Tanis by the Greeks, and that Succoth was Pithom. He conjectures Etham to be the Egyptian *Khetam*, which is on the borders of the desert (*cf.* Exod. xiii. 20), to the W. of the modern El-Khantereh. From hence, he thinks, they directed their course northwards to Migdol (Gr. *Magdolon*, the modern Teles-Semout). Then they encamped between Migdol and the Mediterranean, in face of Pihahiroth and before Baal-zephon (Egypt. *Baali-Tsapuna*), a sanctuary close to Mount Kasios; and it was in the isthmus there, between Lake Serbonis (the 'Serbonian Bog') and the Mediterranean, that the Egyptian army, when in pursuit of the Hebrews, perished amidst 'a sea of seaweeds' or 'reeds,' which has often proved fatal to numerous hosts and single travellers, notably a large part of the Persian army of Ochus about 350 B.C. Arrived at Mount Kasios, the E. frontier of Egypt, they went S. to Marah, or the Bitter Lakes, and from thence to Elim (Egypt. *Aalim*, 'fish-town') to the N. of the Red Sea. It may be mentioned that for 'Red Sea' in the authorised version of E. the Hebrew has simply the 'sea'—xiv. 2, 9, &c.; in other passages it is 'sea of weeds' or 'reeds'—x. 19. See Colenso's *Pentateuch and Book of Joshua* (1860); Brugsch-Bey's *Aus dem Orient* (Berl. 1865), and lecture before International Congress of Orientalists, September 1874; and Birch's *Egypt from the Monuments* (1875).

Ex Offi'cio is a term legally applied to acts done by a functionary in virtue of his office, and not at the suit or on the employment of any other party. In the law of England, an E. O. information is an Information (q. v.) filed by the Attorney-General *ex proprio motu*, and without the intervention of any judicial authority.

Ex'ogens, Exog'enous Plants, terms used in botany in opposition to the name *Endogenous* and *Endogen* (q. v.). E. P. are 'outward growers,' that is, increase by the growth of new matter on the external or outer surface of the already-formed material. All our familiar trees and plants are E., and the name may therefore be regarded as synonymous with Dicotyledons (q. v.). In its young state, an E. stem is entirely composed of cells, but soon, by the growth of bundles of vessels, the stem of the young exogen divides into two parts—an inner or central part, the pith or medulla; and an outer or cutical part, the bark, which is covered by the Epidermis (q. v.). The pith and bark are connected by lines of cellular tissue, named *medullary rays*, which radiate through the wood. The pith is separated from the wood by the medullary sheath. The old wood next the pith is usually hard and dry, and is hence named *duramen* or *heart-wood*, the outer and softer wood being termed *alburnum* or *sap-wood*. Between the wood and bark we find the *cambium* layer of cells, which forms the new wood, arranging it in concentric circles or zones, each representing one year's growth. The bark, cellular at first, consists of the liber or inner bark, and of the corky layer which forms the outer bark. The bark increases by additions to its inner surface, but as its rate of growth is in many cases slower than that of the true wood, it cracks and exhibits the familiar gnarled appearance. The branches of E. are lateral, that is, are given off from the sides of the axis of the stem.

Exogo'nium (or **Ipomæ'a**) **Purg'a**, the species of *Convolvulaceæ* which affords the Jalap (q. v.) of medicine. It is a native of Mexico, but is cultivated with success in many parts of Britain as an open-air plant. Other species are *I. Orizabensis*, from which an inferior quality of jalap is obtained, named 'fusiform' or 'light jalap.'

Exonera'tion (Lat. *ex*, 'out of,' and *onus*, 'a burden'), in law, signifies the legal act which frees one from an obligation.

Exophthal'mia (Gr. *ex*, 'out,' and *ophthalmos*, 'the eye'), protrusion of the eyeball, may be caused by disease of the eye, or by any kind of growth within the orbit. If the case is left to itself, the protruded eye sometimes inflames and bursts.

Ex'orcism (Eccl. Gr. from *exorkizō*, 'I administer an oath'), or the driving out of Demons (q. v.) from those possessed by them, has been practised by Jews, Christians, and Pagans. The power of E. was regarded as a peculiar gift or art, the means used in it being certain incantations or charms, drugs, and ligatures. The first trace of the art among the Jews occurs in the case of Saul, whose demon was exorcised by David's music. Various words, especially names, were used for this purpose. Origen (*Cont. Cels.*) says that the name of Abraham was irresistible, even when used by those who knew not who Abraham was. So was that of Solomon, who, Josephus tells us, was particularly instructed in the art of E. by God, and left rules and charms for it, which Josephus himself saw effectually used by one Eleazar (*Ant. Jud.* viii. 2, 5; *cf.* Matt. xii. 27, and Acts xix. 13). Several acts of E. performed by Jesus Christ are recorded in the Gospels. The power was part of the equipment of the apostles (Matt. x. 1, 8; Luke x. 17–19); hence St Paul, as a true apostle, possessed it also (Acts xvi. 16–18). According to ecclesiastical historians, the same power was continued in the Church. At first it was not confined to particular persons; any Christian could do it by the irresistible charm of the name of Jesus and the sign of the cross. Then, as the whole world was held to be divided between the kingdom of God or the Church, in which demons could only persecute and afflict, and the kingdom of Satan, that is, the pagan world, in which they possessed supreme power, it was specially required that all candidates for baptism should be properly exorcised. For this purpose, in the 3d c., an inferior order of clergy, called exorcists, was instituted, who were ordained to the office. There seems to have been great numbers of demoniacs in those early ages, who were kept in a certain part of the churches, as in an hospital, and it was the duty of the exorcists 'to pray over them on some occasions, and to provide their daily food, and keep them employed in some bodily exercise and innocent business, of sweeping the church and the like, to prevent the more violent agitations of Satan.' After the E. of all candidates for baptism was thus reduced to the ordinary duty of an order of the clergy, the power of extraordinary E. of demoniacs seems to have ceased, and it is admitted by all classes of

writers that E. died out altogether about the time when Christianity was made the established religion by Constantine (324). This was only for a time, however, for there were instances of it after, as well attested as any in the earlier ages. Christian apologists hold very various opinions as to the time when this miraculous power ceased in the Church. The Church historians down to the Reformation all relate the exercise of it down to their own time. By many eminent Roman Catholic writers the same power is brought down to the present day. Among Protestants, the most prevailing opinion perhaps is that it ceased after the time of the apostles, although a century ago it was just as well received that it continued through the first three centuries till the time of Constantine. Others, again, drew the line at the end of the 4th c., others at the end of the 5th, while others put it back to the 2d. Besides persons, certain things were exorcised, *e.g.*, water, salt, and oil, to be used for sacred purposes. See Bingham's *Ecclesiastical Antiquities*, and Dr C. Middleton's *Free Inquiry into the Miraculous Powers in the Christian Church* (1748).

Ex'osmose (Gr. 'outward motion') and **En'dosmose** ('inward motion'), terms applied by Dutrochet to denote the transfusion resulting from the separation of two liquids or gases by an animal or vegetable membrane. See CELLULAR TISSUE.

Exostemm'a, a genus of plants belonging to the *Cinchonaceæ* (q. v.). The species of E. afford varieties of cinchona, known as 'false cinchona,' which may be distinguished from the true cinchonas by having *exserted* stamens, that is, stamens extending beyond the corolla. *E. floribunda* of the W. Indies is a familiar example.

Exosto'sis (Gr. *ex*, 'out of,' and *osteon*, 'a bone'), an unnatural protuberance or morbid enlargement of a bone. E. is predisposed to by syphilis, scrofula, and cancer, and is sometimes hereditary; but, in general, it occurs without any distinct or appreciable exciting cause. *Hard E.* differs in appearance and composition from true bone. *Soft E.* grows rapidly, often attains a considerable size, and is very commonly multiple. In structure and chemical composition soft E. is identical with cancellated bone. It is often necessary to remove such tumours by operation on account of the pain they give rise to from pressure.

Exoter'ic. See ESOTERIC.

Exot'ic Plants, the name generally applied to plants derived from a foreign country. E. P. may grow openly and without care, or may require delicate attention and shelter.

Ex Par'te. In judicial proceedings a step is said to be taken *ex parte* when the opponent, by neglect or refusal to appear, has not been heard in opposition. See DEFAULT, ABSENCE.

Expec'torants (Lat. *ex*, 'out of,' and *pectus*, 'the breast'), medicines which promote the secretion of bronchial mucus, modify the character of the secretions, and promote their discharge. E. are all stimulants, and most of them contain a resinous element. Their use is contra-indicated during the acute or inflammatory stage of bronchitis. The principal E. are—acid, benzoicum, ammonia, A. carbon, ammoniacum, ammonii chloridum, antim. tart., bals. Peruv., bals. Tolut., copaiba, cubeba, galbanum, ipecacuanha, myrrha, scilla, and senega.

Expen'ses. The Costs (q. v.) of a lawsuit are called E. in Scotland. The general rule of law is that the party found in the right is entitled to a decree for his E.; but as it often happens that right is found to be partly on both sides, or that the party mainly in the right has somewhat erred in legal procedure, the adjustment of E. often involves nice calculation and considerable legal difficulty. The practice is for the judge, after deciding points of law affecting E., to remit accounts to the Auditor (q. v.) of the Court of Session to adjust accordingly. If further question arises, the auditor must remit back to the judge. Either party may object to the auditor's report, and his objection will be heard and decided on before the judge in the cause. Clients may require taxation of their agents' accounts. The amount of fees paid to counsel is never interfered with if *bona fide* and reasonable; but a certificate from the counsel or his clerk must if required be produced, that the fees paid were of the amounts and dates stated in the accounts.

Expe'rience is now recognised as the only ultimate source of our knowledge of nature and nature's laws. It is the accumulated result of human observation and experiment, and forms the backbone of all inductive science. Experiment differs from observation solely in the fact that the phenomena observed are controlled and directed to a greater or less extent by human agency, and it is usually undertaken with a view to the testing of preconceived truths, or to the further elucidation of some phenomenon, though frequently the result obtained is not that which was expected. Many of the most important physical laws, indeed, have been discovered from experiments which the investigator made to test some relation which his fancy conceived to exist. On account of the varied combinations which the experimenter has at his disposal, it would naturally be expected that a science in which experiment is possible would be developed much more rapidly and with greater unity than one in which E. rests upon observation merely. Such, indeed, is the case; for of all sciences, meteorology seems the most disjointed and unsatisfactory. Astronomy, it is true, is the most complete of all, and in it experiment in the true sense of the word is not possible; but here such uniformity reigns, that observation aided by theory has acquired a degree of certainty which is scarcely equalled in any branch of experimental science. When once a great general principle in nature is laid bare, progress and development follow immediately. This principle, however, can be discovered only by experiment, or by appeal to experiment. In astronomy, Newton's discovery of the law of gravitation was the signal of progress; and what Newton did for astronomy, Œrsted, Ampère, and Faraday have done for electricity, Young and Fresnel for light, and Rumford, Davy, and Joule for thermo-dynamics. The principle of the conservation of energy is itself a scientific induction from experiment, and to it are due the great strides which scientific knowledge has taken during the last quarter of a century.

Ex'pert (Lat. *expertus*, 'one thoroughly proved by experience'), a term applied to one who has special practical knowledge on any subject, and particularly to an adept in handwriting for detecting forgery, or to a witness in a law-court who has peculiar scientific knowledge, as in the exposure of a case of poisoning.

Explo'sives, the name given to substances which, under the influence of heat, electricity, or percussion, are suddenly converted from a solid or liquid state into a gaseous form, producing an explosion whose force is proportional to the volume of the gas and its rapidity of disengagement. These substances are either chemical compounds or intimate mechanical mixtures. In the former the explosion results from the violent dissociation of the combined elements, as, for example, when the liquid chloride of nitrogen is resolved into its two component gases, chlorine and nitrogen; and in the latter the explosion arises from the combination or rearrangement of the elements composing the mixture, of which gunpowder is the type.

Gunpowder and analogous preparations have long been used for purposes of war and pyrotechnic display, but the bulk of the substances embraced under the term E. have only of late years been discovered, and already their manufacture and utilisation in mining and blasting operations have made wonderful progress. In their respective places in this work, the composition and character of the most important E. will be dealt with; here we only can enumerate those kinds which have been commercially prepared, or practically used, and for convenience of arrangement we shall classify them as mixtures and compounds. In mechanical mixtures a nitrate or a chlorate is the predominant ingredient, and with heat it freely gives off oxygen, which in a nascent condition combines with the other ingredients, generally carbon and sulphur, forming gaseous products. The nitrate mixtures embrace gunpowder, pyrolithe (nitrate with carbonate of soda, sulphur, and sawdust), and poudre-saxifragine (nitrate of baryta, saltpetre, sulphur, and charcoal). The chlorate mixtures comprehend Horsley's blasting-powder (chlorate of potash, charcoal, powdered nut-galls, &c., soaked with nitro-glycerine), Brain's blasting-powder (resembling that of Horsley), Ehrhardt's powder (chlorate and nitrate of potash, powdered coal and tannin), teutonite, chlorated gun-cotton, &c. The chief chemical compounds constituting E. are—nitro-glycerine, and bodies prepared from it—dynamite, dualine, lithofracteur; glyoxiline (gun-cotton pulp and saltpetre saturated with nitro-glycerine and methylic nitrate), gun-cotton, cotton-gunpowder, Schultze's powder (woody fibres treated with nitric and sulphuric acid and hot alkalies, and afterwards saturated with nitrate of

potash solution), nitro-mannite, picric powder, the chloride and the iodide of nitrogen, and the fulminates of mercury, silver, &c.

In Great Britain, on the 1st January 1876, the Explosive Substances Bill, 1875, came into operation. It provides for the greater safety of the public, in so far as it secures the proper conduct of the manufacture, storage, transport, importation and shipment of E., heavy penalties being exacted for non-observance of the regulations.

Storage of Explosives.—Mr W. H. Chambers of the Control Department, Woolwich, has recently invented a magazine which reduces the danger attending storage of E. to a minimum. It takes the form of a cylinder or drum, the sides and bottom of which are formed of materials of low conducting power, as plaster of Paris, Portland cement, and ground cork, with an outer, inner, and intermediate casing of galvanised sheet iron. The top is similarly constructed and is screwed down, and the outer casing is pierced with several small holes plugged with red lead. The holes, on the removal of the red lead, allow of the escape of moisture or steam that may be generated by the exposure of the magazine to great heat. A fire sufficiently strong to raise the outer casing to welding-heat in no way affects the gunpowder stored within. The magazines are as thoroughly damp-proof as fire-proof.

Explosive Material, Law Regarding.—By 24 and 25 Vict. c. 100, whoever shall maliciously, by gunpowder or other explosive substance, destroy or injure any dwelling-house, any one being in it, is guilty of felony subjecting to penal servitude for life. To place or permit any spring-gun, man-trap, or other engine dangerous to life in his ground, renders the owner liable to penal servitude for three years. See GUNPOWDER, LAW REGARDING.

Expo'nent, in algebra, is a number or symbol representing a number placed above and to the right of an expression, thus indicating the power to which that expression is to be raised. (See EVOLUTION AND INVOLUTION.) From this definition we have at once the *law of exponents*, $a^m \times a^n = a^{m+n}$; from which, by putting $n = -m$, we deduce that a^{-m} is the reciprocal of a^m, and by putting it equal to nothing, $a^0 = 1$. In these, m and n may be either integral or fractional. An *exponential* equation is one into which the unknown quantity enters as an E., such as $a^x = b$. The *exponential theorem* is the expansion of a^x in ascending powers of x. The whole subject is intimately connected with Logarithms (q. v.).

Expo'sing Chil'dren. If with intent to kill, this is murder; if the exposure be culpably reckless and the child die in consequence, the act is regarded as highly criminal, and consequently as severely punishable.

Ex Post Fac'to is a legal term denoting an act done to affect a right previously questioned or a demand previously made. An *ex post facto* law operates retrospectively. It is only in extraordinary circumstances that this effect is given to a penal measure.

Expressio'ne, Con, or Expressi'vo (Ital. 'with expression'), a term used in music as a direction to the performer.

Exten'sion (Lat. *extensio*, 'a stretching out'). In logic most terms have a meaning in E. and a meaning in intension, the former comprising the individual things to which the term applies, the latter comprising the qualities which those things must possess. Thus *planet* in E. denotes the earth, Mars, Venus, &c.; in intension it means a heavenly body with the *quality* of revolving round the sun, &c. Different but related terms vary in the quantity of their E. and intension. Thus *animal* has a greater E. of meaning than *man*, as including all quadrupeds and other creatures; while it has a less intension, for among the qualities of *man* must be the qualities of *animal* as well as others peculiar to *man*. If we add the adjective *white* to *man*, we narrow the meaning in E., but we deepen the meaning in intension, *white man* being applicable to fewer individuals than the term *man*, but implying a new quality in addition to the qualities implied by *man*. It is an invariable law that as the intension of a term is increased the E. is lessened, but not in any exact ratio. Hamilton uses *breadth* and *depth* for E. and intension, while Mill uses *denotation* and *connotation*.

Extent', in English law, is a writ at the suit of the Queen, or of a crown debtor. In the former case it is called an *E. in chief*; in the latter, an *E. in aid*. It is of the nature of a writ of execution, and binds all the defendant's lands and property; the person may also be taken unless otherwise directed. A writ of error on an E. lies in the Exchequer, as also in Parliament.

Extent, Crown's, in Scotland. By the treaty of union between England and Scotland the revenue laws of the two countries were assimilated, and the crown's preference and the English form of execution by extent were introduced in revenue matters, with limitation of operation to movable property. By the Court of Exchequer Act the forms of procedure against crown debtors have been remodelled and made similar to the procedure in other cases.

Extor'tion (from Lat. *ex*, and *torqueo*, 'I wrest'), in a wide legal sense, signifies any oppression under pretence of right. In a limited sense it denotes the offence of any one taking money or other valuable officially where none is due, or taking more than what is due, or of requiring a payment before the proper time. The punishment is removal from office, fine, or imprisonment. By 24 and 25 Vict. c. 96, if any one *knowingly send or deliver* any writing demanding with threats money or other valuable, or send or deliver any writing threatening to accuse any one of any crime punishable with death or penal servitude, he is liable to penal servitude for life. And any one accusing or threatening to accuse another of the crimes referred to is declared guilty of felony and subject to penal servitude.

Ex'tract (Lat. *extractum*, 'what is drawn or taken out'), in Scotch law, signifies either the proper written evidence or warrant on which *diligence* or *execution* on a judicial decree may issue, or an authenticated copy of deed or other writing the principal of which, or a transcript of the principal, has been preserved in a public office. The official by whom the E. is prepared and authenticated, and who is usually the clerk of court, is called an Extractor.

Extract of Meat is obtained by separating from animal food all the nutritious constituents and condensing them into small bulk. For commercial purposes the extract is placed in hermetically-closed vessels, that it may remain, for an indefinite length of time, without any putrefactive change occurring. It is useful in many circumstances, for with it beef-tea or soup can be prepared in a short time. Although the extract may contain all the nutritious constituents of animal food, it can never serve as an exclusive article of diet, for quantity is as necessary as quality for the sustenance of animal life.

Extracts are substances resulting from the evaporation of vegetable juices, or the solutions of their active principles. The solutions are obtained by means of such menstrua as water, acetic acid, alcohol, ether, and glycerine, cold or in various degrees of heat. The process of evaporation is best conducted *in vacuo*. E. vary in consistence from a soft paste to a hard, brittle solid, and they may be administered in pill, solution, or mixture. The group of E. comprehends all medicinal substances from the vegetable kingdom.

Extradi'tion (Lat. *extra*, and *ditio*, 'a giving over') is the giving up of a person accused of a crime committed in a foreign country to the foreign jurisdiction. Conventions were concluded by England with France and the United States in 1843 for the E. on both sides of persons accused of specified offences. Similar treaties have been entered into with other powers. The E. Act of 1870 confers on the Queen a general power of making arrangements with any foreign state with respect to the surrender of any fugitive criminal charged with certain crimes, and provides that existing E. conventions should be carried out under the Act. By the E. Amendment Act of 1873 accessories are liable to be surrendered.

Extrajudi'cial. The term is usually applied in law in contradistinction to *judicial*. E. matter is that which is not intended to form any part of the record, or of the judicial pleadings, or admissions of the parties, such as communings or correspondence with a view to a private settlement of the case. E. concessions to avoid a lawsuit cannot be founded on where negotiation has failed.

Extravasa'tion (from Lat. *extra*, 'beyond,' and *vado*, 'I go quickly') is the escape of any of the fluids of the living body from their vessels owing to disease or injury of their coats. The term is most commonly applied to E. of blood, or blood effusions, where the contents of the vessels, arteries, capillaries, or veins,

escape entire into the cellular tissue beneath the skin. In the broader sense of the term there may be E. of blood into any organ or part of the body, or E. of any fluid contained in vessels into any part of the body through which they pass, such as E. of fæces into the abdominal cavity from rupture of the intestines.

Extre'me Unc'tion (Lat. *extrema unctio*, 'the final anointing') is one of the seven sacraments of the Roman Catholic Church, and is defined to be a sacrament 'wherein by the anointing with oil and prayer in the prescribed form, by the ministration of a priest, grace is conferred to the baptized dangerously ill, whereby sins are remitted and the strength of the soul is increased.' The ceremony of E. U. is first met with among the Marcosians, a Gnostic sect in the 2d c., who anointed the dead with an oil or balsam, and pronounced a prayer over them, 'to the end that the souls of the departed, freed from the Demiurgus and all his powers, might be able to rise to their mother, the sophia.' Within the Church it originated in the act of anointing by a bishop or priest, which was immediately connected with the sacrament of the Lord's supper, when administered to dying persons. An anointing of the sick is mentioned by Innocent I. in the beginning of the 5th c., and by Felix IV. in the beginning of the 6th. It came into general use from the 9th c., although it was not universally adopted in the West till the 12th. It is alluded to by St Augustine, St Gregory, Fortunatus of Poictiers, and Gregory of Tours; and in the Greek Church by Origen, Chrysostom, Victor of Antioch, and Cyril of Jerusalem, but the first who spoke of it as a sacrament was Hugo of St Victor.

The Church of Rome founds her doctrine on the subject (Council of Trent, can. 2, 4; sess. xiv.) on Mark vi. 13, and James v. 14, 15, although both of these passages seem to have more reference to the recovery of the sick than to their death. See *Marcosians*, in Neander's *Geschichte d. Christl. Rel. und Kirche*; Walcott's *Sacred Archæology* (Lond. 1868).

Extrin'sic Ev'idence is evidence beyond (Lat. *extra*) that of the deed or document under consideration. The general rule of law is that it is incompetent to contradict or modify the terms of formal writings unless fraud be alleged and proof offered; but in certain circumstances, as where there is ambiguity in the writing, such evidence is admitted in explanation. See EVIDENCE.

Exuda'tion (Lat. *ex*, 'out,' and *sudatio*, 'a sweating') is the escape of a portion or constituent of the fluids of the living body from their vessels, and is not necessarily the result of disease or injury. E. never results from the rupture of a vessel, and in this respect it is distinguished from extravasation. When E. occurs, the vessels may be entire, or their coats may be in a relaxed condition, or a part may be weakened from disease or injury; and the effusion takes place by mechanical filtration.

Exu'mas, The, a cluster of W. India islands forming part of the Bahamas (q. v.). They are known as the 'Great Exuma,' 'Little Exuma,' and 'Exuma Keys.' Great Exuma is 30 miles long and 3 broad. Agriculture and salt-making are the chief pursuits. Salt is exported amounting to 116,000 bushels in a year. Little Exuma is next in importance to Nassau as a port of entry in the Bahamas. Pop. about 2000.

Ey'alet, a former division of Turkey, which was ruled by a pasha, but which gave place to the vilayet on the administrative reorganisation of the empire in 1871.

Eyck, Hubert and Jan Van, two Flemish painters of the latter part of the 14th and the beginning of the 15th c., of whom the chief facts known are that they were the first to make the practice of painting in oils general (see PAINTING), and that they have exercised an extraordinary influence on the development of the art of modern times. Hubert, born at Maas-Eyck near Liege in 1366, was a member of the fraternity of Notre Dame at Ghent, where he died, 18th September 1426. Of his art no distinctively authentic specimens remain, but from the circumstances that he was the instructor of his brother Jan (who was thirty-four years younger), and that they lived and painted together until the latter was thirty-six years of age, and had risen to fame, it is presumable that the reputation of the younger brother was shared in by the elder during the lifetime of the latter. Jan Van E., the great master of the old Flemish school, born at Maas-Eyck about 1390, resided and practised painting with his brother successively at Bruges and Ghent. He was the first to employ drying oils with suitable varnish in painting, and with such success that to the present day his works compare favourably for freshness of colour and for solidity with those of living painters. The 'Adoration of the Lamb,' on which both the brothers worked, but which was completed by Jan, and is his greatest work, is an altar-piece with folding wings. The centre pieces are at Ghent, the wings in Berlin. In the National Gallery are three pictures by Jan, but his chief works are in the museums of the Continent. He died at Bruges in 1440 or 1441. A colossal statue of Jan was completed at Brussels in April 1878. See the Abbé Carton's *Trois Frères Van E.* (Bruges, 1848), and Hotho's *Die Malerschule Hubert's Van E.* (Berl. 1855-59).

Eye (Old Eng. *eag*-e; *cf.* Ger. *aug*-e, Lat. *oc*-ulus). *Anatomy of the Eye.*—The organ of vision consists (1) of external protective parts or appendages; (2) of an optical apparatus of refractive media by which a distinct inverted image of any external object is formed on the retina or sensitive coat; and (3) of the terminal organ termed the retina, connected with the expansion of the optic nerve, which receives the impressions of rays of light and transmits these along the filaments of the optic nerve to the brain.

The External Protective Parts or Appendages.—These are the *eyelids*, which are movable folds of skin, having between the layers a thin plate of cartilage. Each eyelid is lined by a mucous membrane, which is reflected over the surface of the globe of the E. and constitutes the *conjunctiva*. Between the skin and the conjunctiva there are numerous fibres of connective tissue, muscular fibres, the cartilage above mentioned, and numerous small glands called the *meibomian* glands, which secrete matter for lubricating the surface of the eyeball. The *eyelashes* are hairs attached to the margin of the lids. Intimately connected with the external appendages of the E., there is an arrangement for the secretion of the tears, termed the *lachrymal apparatus*, consisting of the following parts: the gland (*lachrymal gland*) by which the tears are secreted near the upper side of the orbit; two small *canals* near the inner angle, into which the fluid secreted by the gland is received; and the *lachrymal sac* and *nasal duct*, or passage by which the tears are conveyed from the lachrymal canals to the cavity of the nose. The eyebrows, eyelids, and eyelashes shade the E. from excessive light, and prevent the access of dust floating in the air. The watery fluid secreted by the lachrymal gland keeps the anterior surface of the E. moist and translucent. When this fluid is formed in excess, under the influence either of an emotion or of an irritant applied to the surface of the E., it constitutes *tears*.

The eyeball is situated in the cavity of the skull termed the *orbit*, in which it lies embedded amongst a quantity of fat. It is moved about by the action of six muscles—four straight, or *recti*, and two *oblique*. By the action of these muscles it may be rotated upon either an antero-posterior or a transverse axis.

The general form and appearance of the eyeball are seen in

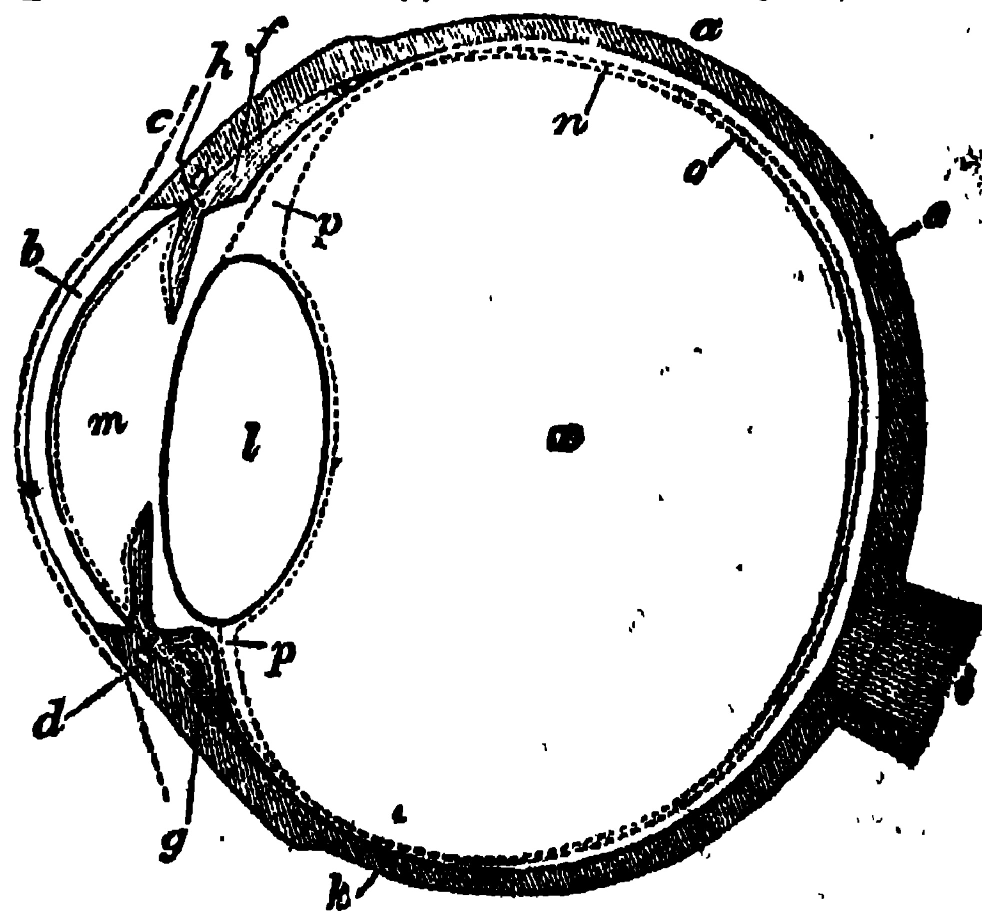


Fig. 1.

Fig. 1. When viewed in profile, the E. is composed of segments of two spheres, of which the anterior is the smaller and more pro-